COLONY OF MAURITIUS

Annual Report

OF THE

Department of Agriculture

1949

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J. ELIEL FELIX, GOVERNMENT PRINTER,
PORT LOUIS, MAURITIUS
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Report of the Department of Agriculture for the year 1949

Policy

With an ever-increasing population and restricted area available for cultivation, it is the policy to promote the most efficient production on all lands capable of cultivation and available for cultivation. The rate of increase of population at the present time is of the order of 15,000 per annum and if health measures at present in progress, e.g., the anti-malarial campaign, are as successful as they are confidently expected to be, then the rate of increase will undoubtedly be greater. It is thus of paramount importance that the one source of national wealth—the Soil—should be utilized to the maximum extent possible and in the most efficient way possible.

It is almost superfluous to state that the basis of agriculture is now, and will probably always remain, the cultivation of sugarcane. Although this crop has been cultivated for such a long time, it is still capable of development and improvement, and these points are constantly kept in view by the staff of the Sugarcane Research Station and specialist officers of the Department of Agriculture. There are, however, large tracts of land at present not efficiently utilized and which are not suitable for the planting of sugarcane. These areas are now the object of close study, particularly for the growing of fibre and tea, the former on the low-lying soils in the dry areas and the latter in the uplands, which are too cold and wet for efficient sugar production.

In an island where the area is only 720 sq. miles and the population is over 450,000, there must of necessity be intense competition for land. Forests must be maintained to conserve water supplies and to provide timber, catchment areas for domestic water supplies must be kept clear of pollution, whilst as much land as possible must be put to agriculture. In order to try to plan the more rational use of land, a Natural Resources Board has been established; this Board has already studied the question of Crown Forests and has submitted a report on the better utilization of these lands. Further questions for consideration await the preparation of a Land Utilization Map.

Sugar

One of the recommendations of the Economic Commission was that a target of 400,000 tons of sugar per annum should be fixed. This target figure was beaten by a good margin, the actual production being about 416,000 tons of sugar, thus beating the record production of 1948 by some 24,000 tons. This increased production was probably more due to the increased area under sugar than to increased production per acre. Due to better prices now being obtained for sugar, marginal lands which could not be worked

economically are now capable of realizing reasonable profits. The widespread planting of M.134/32 is also helping in this connection as it can give useful yields in lands where other canes would fail.

The continued propagation of this cane is a point of weakness in the economy of the island, and other canes are being sought which may be able to replace M.134/32, and there is the possibility of two varieties being released. The cane breeding work of the Sugarcane Research Station is being actively pursued but I regret that work in the other Divisions—Chemistry and Botany—is very severely handicapped by the lack of senior officers. This is particularly regrettable at a time when research should be intensified rather than lessened.

Alcohol

This product continued to be produced for both export and local consumption, in all about 9,000,000 litres being produced, of which 6,000,000 litres were exported. The future of the industry at the end of the year was however obscure for two reasons. First of all, restrictions on the use of petrol have been removed during the year and as a result there was no sale of alcohol for use in internal combustion engines. Secondly, there was no sale for potable alcohol on the English market, and prices paid for industrial alcohol were insufficient to pay for its production.

Tobacco

Because of the fact that there was an accumulation of stocks in the hands of the Tobacco Board, which was not able to finance the holding of such stocks, it was found necessary to reduce the quantity grown in 1949. Permits were issued therefore for a total of 324 arpents to be planted, with the aim of producing about 198 tons of flue cured, and 72 tons of air cured tobacco, or a total of about 270 tons. In fact, there was more flue cured and less air cured tobacco produced than the figures given above, due to flue-cured being planted early in the year when conditions were favourable, and the air-cured being planted later when they were less so.

Issues from stocks for the year exceeded the crop by some 46 tons, so that stocks were reduced by this margin.

Efforts were continued to find an export market for this crop in order that the area under it might be extended considerably. Samples were sent to England, but the reports received about the flue cured samples were not very favourable, whilst those on the White Burley were variable. Samples were also sent to Madagascar and as a result of a visit in December of the *Directeur de Mission Métropolitaine des Tabacs,* prospects were hopeful for this sale to be effected.

Up to 1949, the flue cured varieties consisted chiefly of Amarello, with a certain proportion of New Varieties, which include Yellow Mammoth, White Mammoth, Bonanza, Jamaica Wrapper and Virginia Bright. For the 1950 crop, the decision was taken to plant only New Varieties, but this decision was later revised.

Aloe Fibre and the Government Sack Factory

Aloe fibre (Mauritius hemp) was produced by 27 estates during the year, and production was increased considerably over that of the previous year. Deliveries to the Government Sack Factory amounted to 1,072 tons of Mauritius hemp and 18 tons of sisal fibre, in addition to which small quantities were allowed to be exported.

The lack of an efficient automatic decorticator was still a source of weakness to the Industry, and efforts were pursued to design one. Those at present in use have certain defects, such as high cost of fibre preparation, excessive loss of fibre in the waste, and certain others. Regular plantations based on the method recommended by Mr. G. W. Locke were made, and a start was made on the automatic decorticator by Messrs. Robey & Co., Lincoln, to the design of Mr. P. Lees.

Production in the field is likely to be made easier by the encouraging results obtained with the biological control of *Cordia macrostachya* (Herbe. Condé), a bush which has prevented the exploitation of much wild aloe fibre growth.

The Government Sack Factory was able to work at full capacity, due to the improved fibre supply position. Women wokers were not allowed to work throughout the night and consequently a double shift was worked during the day, from 6 a.m. to 1 p.m. and from 1 p.m. to 10 p.m. with a break from 6 p.m. to 8 p.m. due to shortage of electricity during the peak load period. Extra looms had also been installed. . As a result of these arrangements, the factory produced during the year 977,750 bags of 80 kg. capacity, 63,360 yards of filtr press cloth and 42,600 kgs of yarn for rope and string manufacture. With this number of bags, only about one-fifth of the sugar production could be bagged in locally produced sacks.

Every effort is being made to increase fibre production, and preliminary enquiries have been made with a view to doubling the capacity of the Sack Factory. In time it is hoped to be able to produce all the bags required by the local sugar industry.

Tea

Progress with this crop has been slow, but with the passing of Ordinance No. 51 of 1949 in December, progress in the future will be more rapid. There was but a small increase of the area under tea and production amounted to some 600,000 lb, a quantity approximately equal to that consumed locally. Small quantities were exported during the year, 10,000 lb to the Ministry of Food, and 16,000 lb. to South Africa.

One limiting factor to the extension of tea plantations is the shortage of seed of good jat, and limited quantities of Manipuri jat were imported from Malaya. Part of this seed was used for making plantations on Government land by this Department; 10 arpents were planted for the purpose of seed bearers. A further 20 arpents were planted as a plantation for normal plucking. Some old tea at Crown Land Montille was brought back into cultivation for seed bearers, and some 10 to 15 maunds of seed were collected.

Entomology

The work of this Division has been concentrated on two major lines:—

(a) to control the major insect pests of sugarcane ;

(b) to control the weed *Cordia macrostachya* by biological means.

Parasites of the *Clemora smithi* were introduced from North Africa and from England, but it is much too early to say whether they have established themselves or whether they will be abe to control this major pest. Parasites of the sugarcane borers were introduced from Trinidad.

The fight to eliminate *Cordia macrostachya* (Herbe Condé) appears to be nearing solution. The insect *Schematiza cordiae* Barb. which was released in 1948 has definitely established itself in the field. Many patches of this shrub have been denuded of leaves and inflorescences, and defoliation in varying degrees is widespread. A seed eating insect—*Eurytoma* sp. has also been released in limited numbers, and it has been shown that they can reproduce on *Herbe Condé* in Mauritius. If it succeeds in establishing itself, it should reduce the propagation rate, and thus ease the work of the *Schematiza*.

It has now been established that the white fly associated with the leaf curl of tobacco mentioned in 1948 is *Bemisia tabaci* Lindl., which is the insect vector for transmitting the disease in India.

Animal Husbandry

There has not, as might be expected, been any spectacular developments in milk production, the chief line of improvement at present being undertaken. The improvement of the milk cattle population, whether by selection or by grading up by crossing with Friesians, and the building up of a larger population are both projects which need time and constant work.

The chief method of improvement being practised is by grading up, but there are signs that the 10 bulls imported from South Africa some years ago are now reaching the end of their period of usefulness, as they are getting old and sluggish. They are so heavy that owenrs are not willing to bring their small local cows to be served by them, and are using instead half-bred Friesian bulls, progeny of the original ones. An artificial insemination campaign is also in progress in the south of the Island, which, if successful, will lead to a quicker improvement of the breed.

Two small importations of cattle were made during the year by private breeders, in one case three Jersey animals, and in the other 6 Brahmans.

A fodder survey was completed during the year, and this shows that in general there is sufficient fodder but that there may be seasonal or local shortages. Seasonal shortages are most liable to occur during the months of June–July, and in December–January before the onset of the summer rains when the grass begins to grow again. Local shortages are most likely to occur near urban areas, where many cows are kept and fodder is deficient. Experiments in hay making are being made, with a view to relieving these shortages.

Staff

The staff position still remains serious, and a number of posts have remained unoccupied for a considerable time. This applies particularly to the Sugarcane Research Station where two out of the three senior posts have remained vacant. It cannot be too strongly emphasized that the quantity and quality of research work in such conditions must suffer, and this is particularly unfortunate when the need for improvement is so urgent. Population is increasing rapidly, and even to maintain the present standard of living, it is necessary for agricultural production to keep pace with population increase.

The Deputy Director of Agriculture was absent on foreign leave from 10th February to 4th December and was replaced by the Chemist of the Department of Agriculture. The Registrar Central Board was away from the Colony from 9th March to 4th December and was replaced by the Assistant Registrar. The Sugar Technologist was also on leave during the period 9th March—9th October, and was replaced by the Assistant Sugar Technologist. This Officer visited the United States of America and France during his vacation to invsstigate sugar machinery etc., on behalf of the Sugar Industry.

N. CRAIG,
Acting. Director of Agriculture.

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Statistical Division

1. Meteorological Conditions

October and November 1948 were very good with regard to rainfall which was 113 and 140 per cent of normal respectively. The 1949 sugar crop had thus a very good start. Rainfall, however, turned out to be scanty during the first five months of the year except in February when it was 39 per cent above the normal. It was fortunate, however, that abundant rains fell all over the island in June and that concurrently the temperature remained high for

that time of the year, resulting in continued growth of the cane, so that the plantations had time to recover from the dry season's effect before the crop started. Details about rainfall and temperature are given below:—

Months	*Rainfall as a % of normal*	*Temperature departure from normal*	*Range between Max. and Min.*
January	61	0·0	6·2
February ...	139	—0·8	6·3
March	58	—0·3	6·3
April	91	0·0	5·1
May	41	+0·2	5·9
June	227	+0·7	5·5
July	99	—0·3	6·9
August	48	—0·4	8·6
September ...	47	—0·3	8·2
October	62	—0·4	8·9
November ...	95	—0·5	8·9
December ...	46	—0·5	8·5

From the above it may be seen that 1949 has been a ' cold ' year except for May and June more particularly when the temperature was 0.7°C above normal. This was very appropriate as explained above.

For the third year running there was no cyclone. It may then be said that, on the whole, climatic conditions have been good.

2. Sugar Production

The total cane crushed amounted to 3,361,000 metric tons as compared to 3,158,291 metric tons in 1948. Cane yields have, on the whole, been once more above expectation in most districts. The mean extraction for the island was 12·40 as compared to 12·42 for the last year. The total sugar manufactured amounted to 415,500 metric tons, an increase of 23,500 metric tons on the previous 1948 record crop of 392,000 metric tons.

Climatic conditions have been rather good on the whole, the best favourable factor being, of course, the complete absence of cyclones. The area under cultivation has been increased by about 7,300 acres. These conditions, together with the improved agricultural methods of working, better position as regards fertilizers and the M.134/32 cane, the most important of all factors, have resulted in exceeding the 400,000 metric-ton mark for the first time in the history of Mauritius.

3. Area under Sugarcane

The area under sugarcane was estimated at 166,800 acres, of which about 90 per cent or 150,190 acres were reaped. This was made up as follows:—

	Acres
Land cultivated by estates	66,324
Estate lands cultivated by planters	9,260
Planters' own land	74,606
TOTAL ...	150,190

4. Sugar Market and Disposal of Sugar Crop

The total sugar produced, after deduction of about 20,000 metric tons for local consumption, was purchased by the Ministry of Food of His Majesty's Government.

The total sugar exported during the period 1st July, 1948 to 30th June, 1949, was 381,145·441 metric tons, including 82,034 metric tons from the previous crop.

The amount exported during period 1st July, 1949, to 31st December, 1949, was 304,749·563 metric tons, including 345,442 metric tons from the previous crop.

The apparent local consumption was 18,281·450 metric tons.

5. Importation of Agricultural Machinery and Fertilizers

The above is shown in the accompanying tables:—

A. AGRICULTURAL MACHINERY, TOOLS, ETC.

	Origin	*Number*	*Value (C.I.F.) Rs.*
Ploughs, etc.	U.K.	5	8,125
	Australia	5	21,249
	U.S.A.	1	79,608
Tractors, etc.	U.K.	30	204,518
	Australia	7	72,476
	U.S.A.	30	1,064,231
	S. Africa	parts	3,999
Tools, agricultural and horticultural	U.K.	1,572 kgs.	7,980

B. FERTILIZERS

	Origin	*Kgs.*	*Rs.*
Sulphate of Ammonia ...	U.K.	15,373,371	4,233,415
do. ...	Belgium	4,005,996	1,220,378
do. ...	Korea	500,454	244,939
Lime and other superphosphates	Holland	101,600	18,029
Muriate of Potash ...	France	3,324,352	1,001,887
	Germany	101,326	32,903
Potash Nitrate (Saltpetre)	Chile	1,007,108	286,521
Soda Nitrate (Natural) ...	Chile	5,019,040	1,166,415
Manures other	Australia / Germany (Potassium sulphate)	25,000 / 15,000	8,331 / 5,041

6. Tobacco

376,761·6 kilos of tobacco, valued at Rs. 931,986.59 were used for manufacture during 1949:—

	Kilos
Air cured	98,841
Flue cured	277,920·6
TOTAL ...	376,761·6

The total area planted for the crop was:—

	Planted arpents	*Allocated arpents*
Flue cured	222·35	239·93
Air cured:		
Amarello	102·21	117·00
White Burley ...	0·75	1·25
TOTAL ...	325·31	358·15

The amount of tobacco used in manufacture was as follows:—

	Kilos
Local	369,900·4
Imported	87,673·0
TOTAL ...	457,573·4

7. Fibre, Tea and Vegetable Oil

FIBRE

Fibre received	949,030 kilos
Fibre consumed	1,049,874 ,,
Bags of 80 kilos	898,494 units
Filter press cloth	31,050 yards
Other cloth	532 ,,
Fibre used for rope manufacture ...	32,997 kilos
Weight of fibre exported	212,568 ,,

TEA

The area cultivated in tea was 2,074·42 acres as compared to 2,031 in 1948. The tea produced amounted to 598,773 lb (500 grms.) showing an increase of 36,205 on the previous year. This increase is due mainly to the young plantations which are gradually yielding larger crops as they become older, and also to improved methods of cultivation.

OIL

Innova Ltd. manufactured 1,222,862 kilos of crude oil and 994,495 kilos of refined oil. It also made 331,075 kilos of soap.

8. Livestock—Frozen Meat

The following table shows the importation of cattle, sheep, fowls, etc.:—

Animals	*Country of origin*	*Number*	*C.I.F. Value Rs.*
Cows and Oxen	Madagascar	2,566	581,589
	U.S.A.	6	26,400
	Australia	1	1,500
Sheep	Australia	1,116	70,050
Heifers	Australia	10	10,000
Fowls	South Africa	100	147
	Australia	5	210

In addition, 33 race and 2 saddle horses were imported:—

U.K. ...	30	197,475
France ...	3	30,089
Australia ...	2	2,988
	35	230,552

368,058 kilos of frozen meat, costing Rs. 452,344 C.I.F. were imported from Australia.

Two dogs, bred locally and worth Rs. 250 in all, were exported.

9. Alcohol

The volume of high power alcohol manufactured was 5,207,651 litres, of which 1,025,666 litres were used for local consumption and 59,824 hectolitres were exported.

J. R. LAGESSE,
Statistician.

Cane Breeding Division, Sugarcane Research Station

Climatic conditions have been favourable for arrowing during the 1949 season and, except for a few crosses, the breeding work could be carried out according to expectation. One hundred and seventy crosses have been made at Réduit and 54 at Pamplemousses, or 224 in the aggregate. No crosses have been attempted at Hermitage in view of the very unsatisfactory results obtained the previous year. The breeding programme comprised a wide range of parent varieties ; the West Indian canes and the local variety E.1/37 could be used on a much wider scale than formerly.

The germintion of the fuzz has been, on the whole, very satisfactory at Réduit and Pamplemousses, particularly at the latter station. The good results obtained at Pamplemousses have, however, been partially offset by the occurrence of damping-off disease in the box stage due to over-watering but, fortunately, without serious results owing to the high fertility of the fuzz.

Very dry conditions having been experienced at the end of the year, the seedling plantations could not be completed at the end of December, and a few thousand seedlings have had to be planted after new year. From approximately 50,000 seedlings obtained, a total of nearly 21,000 has been transplanted at the three experimental stations.

Selection from the seedling populations has been carried out on virgins and ratoons and, as large a number of seedlings, commensurate with available ground space, selected and planted direct in second-trials instead of propagation plots as before.

A large number of routine second-trials of the usual exploratory type has been harvested in virgins and ratoons, stress being particularly laid on the ratoon's results.

Approximately seven third-trials have been harvested at the experimental stations, and a certain number of promising seedlings selected for further testing in variety-trials on estates. Seven new trials have been laid down comprising selections from propagation plots or second-trials. Here again, it is always borne in mind that the real and crucial test will come when the ratoons are harvested.

The policy concerning variety-trials has been to plant as many of these as possible on estates under as great a diversity of environmental conditions, in order to exploit the potentiality of the newly bred seedling canes to a maximum. The varieties undergoing test comprise the following: (i) M.213/40 and M.423/41, (ii) E.1/37, (iii) the Barbados canes, and (iv) new seedling canes of our own raising. A report on the results of all trials containing M.213/40 and M.423/41, reaped during the period 1945–1949, has been submitted for consideration by the Cane Release Committee, and a verdict is expected shortly regarding their propagation on estates. Crushing tests to study their factory qualities have been made by the Central Board of the Department of Agriculture. The results obtained with E.1/37 do not, up to now, bulk very largely, but tend to indicate that this cane appears to be especially suited to the cooler and higher rainfall areas of the Island. The productive figures of the Barbados canes bear out those obtained last year, and suggest that B.37161, B.34104 and B.37172 are, in order of merit, the most promising ones in general.

Research work was carried out on the following:—

(i) The possibility of inducing and controlling arrowing in B.H.10/12 and R.P. 8 by photoperiodism, geotropic stimulation, and fertilizer dressings. The first two series of experiments have given negative results ; the results of the fertilizer experiments will be available next arrowing season.

(ii) *Pollen Storage.* The only practical method of pollen storage consisted in preserving the pollen at low temperatures in small glass tubes in a refrigerator. Uba Marot pollen, for example, could be kept fertile for a period of about 10 days, the pollen retaining its maximum fertility for 6 to 7 days. With a more refined technique, it is possible that the life span of the pollen might be increased.

(iii) *Effect of source of planting material on yields.* Latin squares have been laid down at the experimental stations, cuttings of the variety M.134/32 being obtained from five different sources: Réduit, Pamplemousses, Hermitage, St. Antoine and Union (Savanne). The object of the investigation is to determine whether a significant difference in yield and behaviour can be correlated with the source of the planting material.

(iv) Correlation between weight of stool and Brix in seedling populations derived from certain crosses.

The canes imported from abroad, namely, Q.28, 32–8560, C.P.34–120, C.P.36–13, C.P.36–105, which had been planted in a propagation plot at Réduit during the first quarter of the period under review, have had to be destroyed as a result of the outbreak of a new and as yet unidentified disease on Q.28 in Queensland. The first two varieties had been imported from Australia, and the C.P. canes from U.S.A., but all had been grown at the same time and in the same greenhouse where danger of contamination was great and warranted their destruction.

A few cuttings of each of the varieties Co.419, Co.421 and C.P.34–120 have been received from South Africa and planted in the newly erected quarantine greenhouse at the Central Experiment Station. Cuttings of a few other cane varieties are expected from U.S.A. shortly.

Planting material of Mauritius and Barbados cane varieties has been exported by air to several countries on request. Fuzz from a few crosses has been despatched by air to Egypt and Pakistan. Various exhibits, including live cane plants growing in tubs, fertile fuzz, cane bundles, etc., have been sent to England in connection with the London Gardens Show held in July last.

A. DE SORNAY,
Plant Breeder.

Botany Division—Sugarcane Research Station

The weed control problem has this year again been one of the lines of work of the Division. Further investigations were carried out on the so-called "resistant weed species" and on weed species not hitherto investigated. Comparative experiments were also laid down so as to evaluate the herbicidal action of Fernoxone, a dispersible powder concentrate containing 80 per cent Sodium 2, 4–dichlorophenoxyacetate and Agroxone, a fluid containing 10 per cent Sodium 2. methyl 14. chloro-phenoxyacetate. It emerges from these experiments that Fernoxone and Agroxone, apart from a certain degree of selectivity as to certain weed species, gave comparatively similar results in their killing action on the weed species susceptible to the hormone type of weed killers. It is interesting to note, in this connection, that on *Hydrocotyle bonariensis*, a very susceptible species, although the characteristic yellowing of the leaves occurred much more quickly after the time of application with Agroxone than with Fernoxone, yet, no apparent difference in the net toxic effect at equivalent concentrations of active content could be observed. The difference in cost per gallon, calculated on 10 per cent solution basis, lies between Rs. 2.43 and Rs. 3.18 in favour of Fernoxone and as this is an appreciable figure Fernoxone may then prove an excellent substitute for Agroxone in the control of a good many weed species.

The $3 \times 2 \times 2$ factorial experiment laid down in 1947 in order to investigate the fertilizing value of crushed basaltic rock was entrusted to the Chemistry Division, on a recommendation of the Sugarcane Research Station Advisory Committee.

Out of the six trials laid down in 1947, with a view to investigating the yield effects of interplanting foodcrops with sugarcane, two were abandoned owing to the very poor growth of the foodcrop plants and the four others were harvested this year. In two of these experiments a significant reduction in the yield of cane was obtained whereas in the two others the interplanting of foodcrops did not affect the yield at all. Four new trials have been established during the year and these are to be harvested in 1950.

A root pruning test, based on the method evolved by Dr. H. Evans in 1937–38, was carried out with a view to assessing the resistance of the two new sugarcane varieties M.213/40 and M.423/41 relatively to M.134/32, to the eating action of grubs of *Clemora Smithii*. The experimentation was conducted on canes of the same physiological age in Virgins, 1st Ratoons, 2nd Ratoons. The results obtained showed that there was no great difference between these new varieties and M.134/32 in their respective resistance to the grub attack.

Expriments on the use of organo-mercurial compounds and other sugarcane disinfectants in the pretreatment of sugarcane setts were continued this year. It emerges from the results obtained that Agrosan GN, Hortosan DP, Aretan and Abavit S were the best treatments, both in their growth promoting capacity and in their fungicidal action relative to pineapple disease incidence. Three experiments have also been laid down to determine the effect of the pretreatment of sugarcane setts on the yield of cane at harvest.

The Division has this year continued the cultural investigations on secondary crops. Fertiliser experiments were laid down on oats, rice, linseed, sweet potatoes and groundnuts and further a variety-and-time-of-planting-trial together with a planting-distance-trial were also laid down on linseed. The results obtained from this preliminary work have proved stimulating in so far as they have given valuable information for further investigation.

E. Rochecouste,
Acting Botanist.

Chemical Division—Sugarcane Research Station

During the year under review, the Chemical Division was mainly engaged in the maintenance of two series of factorial experiments on estates.

1. Fifteen trials of the first series, dealing with Nitrogenous, Phosphatic and Potassic fertilization were harvested and the following results were obtained:—

(a) The application of 30 kilogs and 60 kilogs of Nitrogen produced an increase in yield of cane of 30 per cent and 41 per cent respectively.

(b) Responses to Phosphate and Potash are, on the average, still small, but have shown a steady increase with successive crops.

(c) Only one trial responded to Phosphate application and another one to Potash, but all the trials harvested gave a significant response to Nitrogen.

2. The second series consisted of five trials harvested in *petite Saison*. The layout was a factorial experiment with 3 levels of Lime, Potash and Magnesia.

On the average, there was no response to either lime or magnesia, but two trials gave a significant response to potash.

The three long term experiments at Central Experimental Station were also cared for, as well as a basalt trial at Hermitage Sugar Estate which was entrusted to this Division during the year.

This basalt trial laid down in 1947 consisted of applications of crushed basalt at 3 levels (nil, 91 tons/arpent, 182 tons/arpent) combined with 2 varieties (M.134/32 and M.63/39) and 2 different levels of fertilization and was harvested in first ratoon.

The results show that both applications of basalt (i.e., 91 tons/arpent and 182 tons/arpent) gave a significant increase in yield, amounting to 3·1 tons and 5·8 tons of cane respectively over no basalt. The difference in yield between the double dose and the single dose of basalt was however not significant.

The double fertilization gave an increase of 2·9 tons of cane over the single one and M.63/39 outyielded M.134/32 by 3·7 tons, both figures being significant.

The Chemical Division has also started at the request of the Conservator of Forests, a preliminary soil survey of the Crown Lands. Most of the work carried out, in this connection, consisted in the recording of soil profiles, in taking soil samples and in their subsequent preparation in the laboratory. The chemical and physical examination of these samples will be made as soon as possible.

A series of pot experiments with small crops was laid down. The object in view is to determine the response of 3 different soil types to applications of crushed basalt and also, in case of a response being obtained, to determine which constituent of basalt is responsible for this response.

SYDNEY M. FEILLAFÉ,
Acting Chemist.

Central Board

In 1949, the Central Board was set up with Mr. Allan, Director of Agriculture, as Chairman, together with the following members:—

Millers' Representatives	Mr. A. Wiehé, Factory Manager of Labourdonnais Sugar Estate. Mr. E. Julienne, Manager of Réunion Sugar Estate.
Big Planters' Representatives	Mr. P. Lagesse, of Grande Rivière Estate. Mr. M. Souchon, of Espérance Estate.
Small Planters' Representatives	Hon. A. M. Osman, of Notre Dame. Hon. D. Luckeenarain, of Rose Hill.

Meetings of the Central Board

The Board held 26 meetings. The main business dealt with may be summed up as follows:—

5	meetings	relative to assessment of planters' sugar.
7	,, ,,	protest against assessment of planters' sugar.
6	,, ,,	applications for changes of delimitation.
2	,, ,,	disputes between millers and planters.
2	,, ,,	method of paying for canes purchased.
2	,, ,,	general business.
1	meeting ,,	cost of transport of canes by tramway.
1	,, ,,	dispute between planters and middlemen relative to drawing up of cane contract.

Registration of Cane Contracts

6,356 cane contracts, out of which 5,122 were on a provisional basis, relative to twenty-nine sugar factories were registered during the year .

Delimitation of Factory Areas

Twenty-three applications for changes of delimitation of factory areas were received. In six cases, the requests of the planters were granted.

As a result of the closing down of the factory of Deep River, all the lands formerly included in the factory area of that estate have been included in the factory area of Beau Champ.

Sugar Factory Licences

Previous to the beginning of the crop, 29 permits were issued to all factories and new plans supplied to the factories whose areas have been altered.

Permits to Middlemen

Thirty-six permits were delivered during the year against 34 in 1945 and 60 in 1940. One middleman failed to comply with the terms of his contracts with planters; appropriate action is being taken against him.

Investigations

Fifty-six investigations were carried out relative to delimitation of factory areas and to disputes between millers and planters. Detailed plans and reports thereon were submitted to the Board. In many cases disputes were settled amicably.

Control of Cane Weighbridges

A total of 167 weighbridges dealing with planters' canes have been tested during the year. Eighty were found on first inspection to be accurate and in good working order. Sixty-six weighbridges were found to be inaccurate and had to be adjusted to conform to the standard of accuracy laid down in Government Notice No. 92 of 1942, and a further 21 weighbridges were found to be in bad working order and had to be re-examined. Of these, 14 were found accurate at the second examination and 7 had to be adjusted again.

One obsolete weighbridge at Beau Sejour which had been condemned by the Inspector after the 1948 crop was replaced by one in good mechanical condition.

During the year under review, 259 surprise checks were carried out at the various weighbridges in the Colony and 411 vehicles which had been previously weighed were re-weighed. For the first time since the Central Board took over the control of weighbridges only one weigher was found in default and was prosecuted. It can thus be said that planters' canes are now weighed in a very efficient manner all over the Island.

Cost of Transport of canes by road and tramway

This year for the first time a cost has been worked out for canes delivered by road and this, it is hoped, should help towards the control of costs generally, together with the segregation of transport by the two methods, viz., road and tramway.

There are again wide variations both in road and tramway costs, and if time permits a further and more detailed examination to ensure that distances have been accurately measured and that individual items have been correctly posted to costs will be undertaken. In the latter connection, it is felt that the working of cost of production for all estates would do a great deal towards ensuring that items have been correctly allocated, both to transport and all other operations.

Cost of Production

As intimated in last year's Annual Report, investigation into millers and planters costs have been undertaken during the year and should prove useful as a guide to the Board in its findings.

Approximately half the total factories of the Island have been examined together with some 60 large and small planters thus giving a good cross section of costs and profits within the sugar industry and as examples have been selected from all areas the results will reflect an approximate average for the whole industry.

There are wide variations between the lowest and the highest costs both for millers and planters which are doubtless due to various causes such as the efficiency factor involving sound management and knowledge on the part of both miller and planter, and in the case of the former also having modern factory to crush cane with a view to obtaining maximum extraction ; also matters of geographical locality, climate and irrigation all doubtless play their part in the final results achived. The Book-Keeping and Accountancy on estates shows signs on the whole of progress and the standard cost sheet has doubtless done something in this connection, but some estates leave a great deal to be desired in the posting of prime entries into cost and the item " Dépenses diverses " or " Sundry Expenses " in *Frais Généraux* is often found to be used as a receptacle for items that should be placed elsewhere.

It is stressed that if accurae satistics and costs are to be obtained much greater care should be exercised in the posting of individual items. Cases have also been found where capital expenditure has been posted to current expenditure and this involves an important point of principle affecting cost and profit. In the case of factories there has been on the whole a readiness to co-operate which has been very gratifying and in this spirit it is felt a great deal of progress should be made towards better and more accurate costs and accounts.

In the case of planters, a great deal still remains to be done and although a few maintain good records and costs, it is but a small percentage of the whole. In this connection, a standard cost sheet could be devised for planters of quite a simple character setting forth the monthly expenditure in analysed form showing the operations involved in the cultivation of sugarcane such as planting, manuring, weeding, etc., and the twelve monthly cost sheets could then be summarised at the end of the financial year and form the basis of the planters' total cost.

In view of the many fluctuating factors affecting costs as between various estates and areas the extraction of costs of production for the present at least should be conducted each year for all factories with a corresponding number of large and small planters costs covering those already examined for the purpose of comparison together with new cases added each year.

Cane Testing

The cane testing service again experienced a very busy year. 2,890 sucrose content determinations were carried out on planters' canes and five additional cane testers, recruited mostly from the ranks of the Agricultural College graduates, were employed for the duration of the crop. As a whole, the work went on smoothly and the ready co-operation of millers and of planters was very much appreciated.

An increased number of applications for sucrose content tests were met and owing to the large number of provisional contracts entered into by the parties a cane-tester had to be stationed full time at a factory. Another miller manupulating over 75 per cent of planters' canes has applied for a full-time cane-tester to be stationed at his factory. This request will be borne in mind when planning the 1950 crop.

No change has been effected in the method of computing the sucrose content of planters' canes. The average sucrose per cent cane throughout the Island was about the same as in 1948.

The quantity of planters' produce was generally good with the cane variety M.134/32 largely predominating. It was noticed however that a fair amount of prohibited cane varieties including ' Uba ' seedlings were being cultivated in certain well-defined localities. This is to be deplored and it is hoped that steps taken will put an end to such practice.

It was pointed out in last year's report that the canes supplied by a number of planters, large planters especially, contained a relatively high proportion of trash and ' white tops '. No improvement in that connection has been observed this year. A well-conducted and strong ' no-white-tops ' campaign would certainly result in very significant savings on production costs.

No juice scales have yet been installed as under the terms of Ordinance No. 4 of 1948.

Assessment of Planters' Sugar

On the whole, less dissatisfaction was expressed by interested parties on the preliminary assessment of planters' sugar made by the Board.

Protests from planters were however received by the Board concerning its general policy relative to the following main points:—

1. That the amount of sugar accruing to planters be assessed on the basis of yearly extraction instead of an average extraction of five years. The five-year extraction basis was adopted by the Central Board to smooth out to some extent the seasonal fluctuations in the sucrose content of canes due to climatic conditions and other causes, thus mitigating the effects of a bad season. Provision against cyclones and droughts having now been made by the Sugar Industry in the Cyclone and Drought Insurance Fund Ordinance (1946) and the majority of planters having expressed the desire that the five-year average basis be discontinued, the Central Board has decided that, as from the 1949 crop, the assessment of sugar to planters shall be based on the yearly extraction obtained from their canes.
2. Planters delivering canes at the factory yard should not be made to contribute towards the cost of transport of planters delivering canes at a distance from the factory and transported by the millers. Production costs are being worked out so as to enable the Board to reconsider the question. It is felt that a hasty departure from the policy adopted at present might have very adverse effects on the economy of a good number of planters.

3. Planters who produce 250 tons of cane (instead of 500) in any one harvest should be eligible for sucrose content tests. The Board was unable to give satisfaction to planters as under local conditions it is practically impossible to carry out tests when a planter does not supply well over 250 tons of cane per crop season.

The recommendation of the Mauritius Economic Commission to the effect that an improved formula in the place of the present basis of determining the price of planters' canes be adopted, was considered by the Board. The Commission had suggested the following basis: the award to cane-growers of all the profit after deduction of *(a)* Manufacturing and Distributing expenses; *(b)* A fixed rate of interest on the Capital invested in factories.

The Central Board was of the opinion that the proposed new basis would offer serious difficulties, namely:—

1. There is a wide fluctuation between factories in manufacturing and distributing costs, some items such as executives' salaries, commissions, etc., being in certain cases of an excessive nature and their admission into cost in full would tend to result in a penalty being imposed on the planter, and the same may be said of other items such as the maintenance of cars, lorries, estate grounds and buildings. Whilst the present system of free enterprise exists in the running of estates and sugar factories, it is difficult to see how Government can disallow certain items of cost (or part thereof) without the consent of the millers.
2. Share Capital in many cases bears no relation to the working capital of the industry, the share capital in some cases perhaps being only a fraction of the actual capital employed.

The conclusion arrived at by the Board was that the present method can undoubtedly be improved upon, but a very careful study is required over a long period to ensure that any new formula will adequately deal with seasonal fluctuations and a lack of industrial uniformity.

Cane Varieties

Factory tests were carried out on a number of canes produced by the Sugarcane Research Station. The results obtained revealed that the variety M.423/41 is the most promising one and on the whole it compared favourably both in yield and sucrose content with the M.134/32.

R. Avice,
Registrar, Central Board.

Agricultural Division

Staff

Once again, the Division worked at reduced strength throughout the year. Mr. E. Lesur, Agricultural Officer, acted as Tobacco Officer in addition to his other duties. Mr. A d'Emmerez de Charmoy was again fully occupied with the Food Production Board. Mr. P. Regnard, seconded from the Entomological Division, was given special training for the purpose of posting him to Rodrigues where, in July, he relieved Mr. P. Guerandel who had been acting

as Agricultural Officer in the Dependency. A post of Agricultural Instructor remained vacant and will be filled when the 1949–50 Estimates are finally approved. Various changes occurred among the Overseers: Mr. M. Fakim was posted to Rodrigues vice Mr. P. Hungley who was transferred to the Royal Botanical Gardens. Mr. C. Boolkah was given charge of the Allotments, while Messrs. S. Tumba Naik and M. Bhurtun were moved to Barkly Experimental Station and Abercrombie Nursery respectively.

Experimental Stations and Nurseries

The three small experimental stations were cropped to capacity during the year. The results of the work accomplished is recorded in different sections of this report. As usual, the Central Experimental Sation, Réduit, was mainly devoted to the carrying of stock, the maintenance of variety collections of foodcrops and the raising of vegetable seeds. A few small trials with food crops were also carried out there. At Barkly and Pamplemousses Experimental Stations, the work comprised chiefly the production of vegetable seeds, various trials with food crops and condiments, and the propagation of fruit and ornamental plants for sale to the public.

All three stations were maintained in good condition and received many visitors during the year, especially at Barkly and Pamplemousses. All were made welcome and given all necessary information on the various plants and crops they wanted to grow. To this end, an Agricultural Officer was usually in attendance at Barkly every Saturday morning.

Gardens and Nurseries

Two public gardens, the Royal Botanical Gardens, Pamplemousses, and Telfair Gardens at Souillac, come under the general supervision and administration of this Division. Telfair is small and unimportant but Pamplemousses has been in existence for over one hundred and eighty years and is known far and wide to botanists and horticulturists. In addition to its maintenance as a park, an effort is continually being made against heavy odds to uphold its reputation as one of the famous gardens of the world. Botanically, it contains a rich collection, and demands of seeds, particularly of indigenous palms, are received frequently from other similar institutions abroad. This work makes a considerable inroad upon the time of the officers responsible for these gardens. It was maintained up to standard during the past year.

Through the courtesy of the Engineer in charge of anti-malarial works in the north of the Island, a small lake was excavated mechanically; the soil removed from its site was used to fill up depressions in which, during the rainy season, the anopheles mosquito breeds by the millions.

Nurseries for the propagation of fruit and ornamental trees to meet the requirements of the public, those of the various Government institutions and the normal replacements at the gardens themselves, were maintained at Barkly, Abercrombie and Pamplemousses.

Plant Introduction

Apart from its popularity as a visiting sight not only for Mauritians but also for foreigners, who usually make a bee line for them, the Pamplemousses Gardens provide the seeds which are exchanged for introduced planting

material. During the past year, such exchange was done on a considerable scale. Among the more interesting introductions, the following may be listed:—

Two varieties of *paddy* from Madagascar;

Bolosanthus speciosus—or Rhodesian Wistaria, a pretty ornamental plant with mauve flowers;

Nine varieties of *Bougainvilla* from Singapore. These were brought in by ship. Four varieties survived, namely: *Amarault, Lancaster, Carnarvon* and *Maud Chettle.*

Five varieties of *Guava* from Florida, one of which was specially introduced for its high ascorbic acid content. This is now growing satisfactorily.

Panicum sp. and *Dactyloctenium aegyptium*, two useful fodder grasses from Rhodesia.

Crataegus pubescens or *Mexican Hawthorn* from the Union of South Africa where this profusely fruiting tree is being rapidly propagated for cattle food. It is hoped that it will be a useful introduction for our dry coastal areas.

Setaria of Bua River, a fodder grass of high performance bred at Bua River, South Africa.

Chinese White and *Flowering Cabbages*, from Singapore; these have not shown themselves superior to our own acclimatized types.

Amaranthus gangeticus var., from Singapore. Two varieties were introduced, one of which is distinctly promising and an improvement over the local type. It should prove a valuable addition to the local " greens " as a vegetable.

Two *Tabebuia* species, from Florida, if successfully acclimatized should add to the list of our beautiful ornamental trees.

A small collection of other ornamentals, including some *Bauhinias* were received from Nyasaland for sowing in 1950.

Plant Propagation—Experimental

The development of suitable means of propagation of certain fruit trees and ornamentals under local conditions was given as much attention this year as in 1948. There has been considerable success with *mango* and *avocado*. This work may be briefly reported upon as follows:—

(a) Mango. Preliminary trials made at the end of 1948 showed that the Malayan patch budding method used for *Hevea* was the most promising approach to the satisfactory solution of a problem which has occupied Mauritian horticulturists for years. In addition to technique, the season of the year and the altitude at which grafting is carried out are factors to be taken into consideration. Another factor, the incidence of Cecidomyiid fly attack must not be lost sight of. This is at its peak in February and any young grafts sprouting at that period are likely to be destroyed under the severity of the attack. To

meet this difficulty, it was deemed advisable to begin grafting in October. This proved too early, the temperature being still too low. From the results so far obtained with the Malayan Hevea patch budding method—just over 50 per cent success—it appears that mango in Mauritius should not be budded before December or after February. It remains to be seen how far the Cecidomyiidae can be locally controlled—possibly by means of a glass house for mango propagation—to settle finally the best time for propagating this useful fruit.

(b) Avocado. What is believed to be a new method of grafting avocado has been evolved. On well-established stocks, seven months old, with stems half an inch in diameter, an incision is made a few inches above the collar. This is in form of a T. The scion, trimmed appropriately and carrying a terminal bud, is inserted on the cambium after opening out the two flaps of bark on the stock. Ten days after grafting, the stock is cut at a height of one foot above the ground. Twenty days later the scion begins to sprout. No leaves must be removed from the stock until the scion has well taken. Success has been registered in the region of 80 per cent.

(c) Litchi. Grafting of litchi *(Litchi sinensis)* on longane *(Euphoria longana)* has been tried in an attempt to cut down the relatively high labour costs involved in the production of litchi layers. Side-grafting on two-years old stock has been done, but it is still too early to reach definite conclusions.

(d) A number of plants in addition to *Bread Fruit* are being multiplied in the solar propagator by means of root cuttings. Success, so far, has been attained with *Guava,* Caripoullay *(Murraya Koenigii)* and *Cassia calceolaria.* Trials are under way with *Kaki* (Japanese persimmom or *Diospyros kaki)* which does well up-country but is almost unknown in Mauritius.

(e) Pecan. The pecan nut tree is also being propagated experimentally in the solar propagator by means of root cuttings. Although the crop may be seriously affected by cyclones, the tree itself is fairly resistant. It has a very pretty foliage and bears fairly well when old enough. There are 36 plants of different varieties at Barkly. A record of the number of nuts obtained in the last three cyclone-free years is of some interest:

1947	...	... 5 trees gave	259 nuts
1948	...	... 17 ,,	4,985 ,,
1949	...	... 24 ,,	7,008 ,,

(f) Bougainvillea. Difficulties encountered in the multiplication of these decorative plants have not yet been overcome. Results to date indicate that propagation should be carried out at low altitudes in the months October—December. Work on this line will be continued next year, chiefly at Abercrombie Nursery.

(g) *Eupatorium pallescens*. With the rapid biological destruction of *Herbe Condé*, on the flowers of which Scoliid parasites of Phytalus feed, it became imperative to find another food-plant, especially in the dry coastal areas, for these parasites. *Eupatorium pallescens* provides an excellent answer but, although introduced into the Colony since 1930, its propagation by seed was hitherto almost impossible. The solution to the question was found at Barkly Experimental Station where over ten thousand plants were propagated during the year for distribution to sugarcane growers throughout the Island.

Production of Vegetable Seeds

The production of seeds of the finer vegetables, of which most of the European types are acclimatized in Mauritius and flourish through a good part of the year, mostly in the cool season, has now become a permanent activity of the Division. It is hoped to develop this line of work further when the scheme for the enlargement of the various experimental stations is implemented. The effect on total vegetable production in the Island, although indirect and difficult to assess, is none the less important.

Weather conditions were very favourable. The only trouble experienced was with certain peas which suffered severely from root disease, and tomato (Marglobe) which fell a victim to blight and bacterial wilt.

For the first time since the inception of the work in 1943, carrot seeds were released for cultivation. These seeds on which selection work has been steadily pursued for the last six years met with instant and general approval. Beet-root seeds are now the only ones on the list which have not yet been released. Work is proceeding on the improvement of a number of locally-raised strains all of which at present come up to maturity rather too quickly.

The following table gives the quantities of seeds produced since 1945:—

Type	*1945 in kilos*	*1946 in kilos*	*1947 in kilos*	*1948 in kilos*	*1949 in kilos*
Amaranthus sp.—Brède Malabar ...	—	—	—	—	1·20
Beans—Total	350·00	230·50	306·40	381·20	328·70
Victory	—	—	176·50	220·30	194·60
Golden Queen	—	—	72·10	64·90	46·80
Long Tom	—	—	14·30	23·10	17·60
Prolific Long-podded ...		—	23·80	29·40	10·80
Canadian Wonder ...		—	18·70	43·50	58·90
Bean, Broad "Bocla"	—	—	1·00	5·30	0·40
Butter	—	2·7	—	—	—
Winged	6·0	3·0	—	—	4·30
Beet-root	1·5	2·5	0·50	0·50	2·50
Bitter gourd—Chinese	—	—	0·14	—	—
Brède de Chine—Blanc	0·50	0·70	7·10	6·01	13·30
Bouquet	0·50	0·70	5·80	26·20	—
Salé	—	—	—	—	12.50
Brinjal—Rosita	3·0.	2·8	1·73	1·74	1·20
Capsicum—Total	—	—	2·10	0·47	1·10
Chinese Giant	4·8	1·1	0·62	0·36	1·10
Neapolitan	4·8	1·1	0·83	0·11	—
Maul's Red Hot ...	4·8	1·1	0·65	—	—
Carrot	2·60	1·20	0·50	2·40	2·50
Cauliflower	5·00	5·00	6·50	7·00	2·50
Coriander	—	—	—	—	109·50
Cowpeas	3·00	15·40	12·80	16·50	55·40
Leek	0·10	—	—	1·20	1·20

Type	*1945 in kilos*	*1946 in kilos*	*1947 in kilos*	*1948 in kilos*	*1949 in kilos*
Lettuce—Total	8·00	8·7	5·82	3·82	5·20
"Blonde d'été" ...	—	—	1·81	2·10	1·80
Iceberg	—	—	—	0·52	1·60
Mignonette	—	—	2·00	0·49	1·00
Sucrine	—	—	0·34	0·11	0·50
Webb's Wonderful ...	—	—	1·17	0·60	0·30
Onion	—	—	—	—	1·20
Peas—Total	325·00	68·60	119·12	200·10	198·80
Black-eyed Susan	—	—	22·00	36·70	20·40
Greenfcast	—	—	89·30	154·70	132·20
Local	—	—	6·10	8·70	46·20
Petsai Distin's type	4·50	—	1·72	10·62	7·40
Radish...	1·00	—	—	1·83	5·70
Rave	—	20·00	—	43·50	—
Salsify	7·00	5·00	5·00	10·30	10·00
Solanum nigrum—Brède Martin ...	—	1·00	—	0·52	3·00
Tomato—Total	2·90	1·20	0·68	1·38	0·60
Bounty	—	—	0·04	—	—
Hawaii	—	—	0·06	—	—
Marglobe	—	—	0·56	1·38	0·60
Peal Harbour	—	—	0·02	—	—

Revenue

Although there has been no change in the policy so far followed, namely, to place at the buyer's disposal a diversity of useful plants and seeds at low prices, and although there has been no rise in these prices, the revenue derived from the sale of plants and seeds has again beaten all records. The total revenue from this source, including the value of material supplied free to Government Institutions, reached the unprecedented figure of Rs. 13,299 as follows:—

Station	*1946*		*1947*		*1948*		*1949*	
	Plants	*Seeds*	*Plants*	*Seeds*	*Plants*	*Seeds*	*Plants*	*Seeds*
Barkly	1,827	—	2,780	—	3,179	2,470	4,077	3,447
Abercrombie	2,149	—	3,076	—	3,803	—	4,699	157
Free to Government Institutions	647	—	526	—	394	644	270	649
TOTAL ...	4,623	2,312	6,382	1,081	7,376	3,114	9,046	4,253

Experimental Work on Crop Plants

Notwithstanding shortage of staff and exiguity of space, a creditable amount of experimental work was carried out in the field, mostly at Pamplemousses and Barkly Experimental Stations. The production of vegetable seeds has already been mentioned. The trials made with the various crops will now be referred to briefly.

(a) CORIANDER

Sown at Pamplemousses, following groundnuts, on 20th May, in drills 18 ins. apart, variety *Morocco* gave a net yield of 725 kilos seeds after four months. The plot was not irrigated, although watering was necessary to initiate germination. No manure or fertiliser was applied.

At Barkly, the same variety sown at the beginning of June, harvested on 5th November, gave a net yield of 732 kilos per acre. Wood ashes, at the rate of 5 tons per acre, had been applied before sowing.

The retail price of the commodity at the time of harvest was Rs. 1.50 per kilo. The gross proceeds, therefore, may be estimated at over one thousand rupees per acre. It is becoming increasingly clear that the Colony should produce all the coriander it requires.

(b) Cowpeas

At Pamplemousses, cowpeas (var. *Mottled*, large), sown on 7th December, 1948, reached the kitchen stage on 9th February, 1949. They were reaped for seed, the harvest being completed 161 days after sowing. The yield per acre was 432 kilos dry seeds.

(c) Dholl Kessari

Two small trials were laid out: one at Pamplemousses, the other at Barkly, the yields obtained being 169 and 334 kilos per acre of the air-dried pulse. It appears that the yield was depressed at Pamplemousses through over-generous manuring. The yield at Barkly compared favourably with that obtained the previous year. At the time of harvest, the value of kessari on the local market was Re. 0.92 per kilo.

(d) Garlic

Garlic is generally consumed in Mauritius, espacilly by the Indian element of the population. It is grown in various parts of the Isand in small patches ; some is imported from Rodrigues and the remainder of the requirements from elsewhere. The plant grows well here. Owing to the difficulty of ascertaining what yields are obtained by small growers, a trial was laid down at Pamplemousses. Planted in March, 6 ins. × 6 ins., with phosphatic guano, farmyard manure and wood ashes, and harvested 173 days later, a green yield of 3·3 tons per acre was obtained. This gave a net yield of 2·3 tons after drying in the air and deducting the weight of " seed " used per acre. Water was applied on four occasions. The retail value of the crop at harvest was Rs. 1.80 per kilo.

(e) Groundnuts

(i) At Pamplemousses, a small trial was laid down to compare the yields of the *local* variety and of *Uganda*, a bunch variety imported two years ago for large scale plantations. *Local*, which is a trailing variety was expected to outyield *Uganda ;* it did so to the extent of 567 kilos of air-dried, unshelled nuts per acre, producing 1,071 kilos against 504 kilos by *Uganda*. *Local* proved completely resistant to bacterial wilt.

(ii) Another trial laid down out at Pamplemousses compared the yield under conditions of no irrigation of the old varieties in the collection. No fertilizers were applied as the groundnuts followed a well-manured potato crop. Planting distance was very narrow (12 ins. × 12 ins. and there were 3 seeds per hole. *Cabri* outyielded *San Jose*, *Vigan Lupog*, *Valencia* and *Tennessee*, giving 850 kilos of dry unshelled nuts per acre. *Buit* and *Virginia* Bunch outyielded *Cabri*, but their crop cycles were 163 and 182 days respectively as compared with 126 days for the other varieties in the trial.

(iii) At Réduit, following manioc, groundnuts were interplanted with maize sown at the following spacements 3′ × 3′, 4′ × 2′ and 4′ × 3′. Fertilizers were applied to half the trial, while the other half received none. The yields of maize and groundnuts were as follows in kilos per acre:—

Spacement	...	...	3′ × 3′		4′ × 2′		4′ × 3′	
			Maize	*Ground nuts*	*Maize*	*Ground nuts*	*Maize*	*Ground nuts*
With fertilizers	...	...	1,702	179	1,537	166	1,411	232
Without fertilizers	...	...	1,579	168	1,612	170	1,411	188

(iv) At Barkly, a small trial compared the yields resulting from seeding at the rate of two seeds per hole with four seeds per hole. This trial is particularly interesting from the fact that all small planters plant by hand, closely and with several seeds per hole. No manure or fertilizer was given, the trial following a crop of winter vegetables. Planting distance was 14 ins. × 14 ins. The plots were randomised and replicated 6 times. The seeds were sown on 27th November, 1948, and harvested on 5th April, 1949. The mean yield per acre of air-dried nuts were:—

	kilos
Two seeds per hole	717
Four seeds per hole ...	827

At the time of harvest, unshelled groundnuts were selling at Re. 0.38 per kilo. The higher density plots required 55 kilos of seeds per acre, the lower 26 kilos.

(v) The following varieties received from East Africa were placed in a small scale trial at Barkly and compared with *Cabri*: *Manyema, Mwitunde, Mgongo, Rolande, Barbeton, Virgin Bunch.* The yields were good, being respectively 1,074, 1,039, 1,122, 1,029, 1,056, 677 and 834 kilos of air-dried, unshelled nuts against 924 kilos produced by *Cabri*. Symptoms of an undetermined disease were noticed. These varieties, therefore, will be isolated at Réduit next season for observation.

(f) Lalo

Lalo or *Okra (Hibiscus esculentus)* is grown by small planters on some scale in summer. So far, no data existed as regards the yield of this vegetable at the cooking stage. A trial was laid down at Pamplemousses in December, 1948, to determine this. Picking began on 16.2.49 and was continued at weekly intervals until 17th May. The yield obtained was 2,010 kilos per acre.

(g) Lentil, small

Sown at Pamplemousses on 14th May, a plot of small lentils, harvested on 20th September gave 78 kilos of air-dried seeds per acre. A small but undetermined portion of the crop was lost through depredation by birds which proved costly to keep off the ground. Lentils were selling at Re. 0. 70 per kilo at the time of harvest.

(h) Maize

(i) A planting distance and thinning-out trial was carried out at Pamplemousses. The distances were:—

A^1 = 3′ x 3′	with	3	seeds per hole thinned later to	2 plants
A^2 = 3′ x 3′	,,	2	,, ,,	1 plant
B^1 = 3′ x 2′	,,	3	,, ,,	2 plants
B^2 = 3′ x 2′	,,	2	,, ,,	1 plant

Apart from 30 kilos nitrate of soda per acre, no fertilizers were applied. The yields were: 495, 485, 623 and 534 kilos respectively.

(ii) In another trial carried out at Barkly, maize sown 3′ × 3′ with two and three seeds per hole and thinning down to one and two plants respectively, the yield of the two-plants plots was 1,730 kilos as against 1,025 kilos of air-dried grain for the plots with a single plant in each hole. This trial was preceded by a crop of well-manured fine vegetables and received only 25 kilos of sulphate of ammonia per acre.

(i) MANIOC

(i) A trial comparing two different planting distances was laid out at Pamplemousses in November 1948, and harvested in July this year. The spacings were: *(a)* 2½ ft. × 4½ ft. and *(b)* 2½ ft. × 2½ ft. The manioc followed soya and no fertilizers were applied. The wider spacing gave a yield of 6·1 tons per acre as compared with 5·3 tons for the closer planting.

(ii) Another interesting experiment was also carried out, with the same two spacements as above. In this trial, yields and cooking quality at various ages—6, 8, 10, 12 months—were compared. The variety concerned was the popular *Manioc de Table* which was planted in November, 1948. Results are best expressed in tabular form:—

TABLE I

Harvested after	*Date of Harvest*	*Rainfall*		*Yield per acre (tons)*		*Cooking quality*
		Ins.	*Days*	2½′ × 2½′	4½′ × 2½′	
6 months ...	1st June ...	29	108	6·23	5·59	Excellent
8 months ...	1st August ...	35	150	4·42	7·41	Excellent
10 months ...	7th October ...	36	176	8·60	7·50	Poor
12 months ...	5th December ...	39	193	8·46	6·49	Fair
	AVERAGE			6·93	6·75	

Similar experiments will be repeated in the future to determine the length of time during which manioc cooks satisfactorily. The above trial was on a very small scale.

(j) ONIONS

The small red pungent onion has been cultivated for a long time in Mauritius. It grows well in many parts of the Island, and there is no reason why the country should not produce all its requirements. This cultivation is in the hands, almost entirely, of small growers. Determinations of yields under controlled conditions should prove of interest to them.

The so called "March Sets" are small onions raised from seed the preceding November—December. In general practice, these sets are planted in March. In this trial, the sets were planted on 12th March, 6 ins. × 6 ins. Phosphatic Guano at 350 kilos per acre was applied together with 4½ tons farmyard manure and wood ashes. The crop was harvested on 26th July, giving a fresh weight of bulbs of 8·90 metric tons per acre drying out to 4·45 tons. The retail value of onions at that time was Re. 0.80 per kilo. Attacks of *Thrips* were successfully controlled by six applications of 0·25 per cent Agrocide solution.

(k) Phaseolus Species

Phaseolus radiatus, sown in January at Pamplemousses, and harvested in May, gave 225 kilos of seed per acre. *Phaseolus aureus* proved a failure as a result of serious attacks of *Melanagromyza*. *Phaseolus Mungo* gave 380 kilos.

(l) Potatoes

Once again, " seed " kept over from one season to the next in cold storage at 5° to 6°C was planted at Pamplemousses. This has been done since 1945 and will be continued for a year or two more owing to the fact that greater storage space has been kindly placed at our disposal in the enlarged cold store. This year, in addition to the *Malgache* variety, the original parent, tubers of which date back to 1945, *Up-to-Date* imported last year was also kept over and placed under trial in comparison with *Malgache*. *Up-to-Date* showed itself more susceptible to blight than *Malgache*. In the trial, 13 tons farmyard manure, a liberal dressing of wood ashes, 500 kilos phosphatic guano and 225 kilos nitrate of soda were applied. The weights of seed used were: *Malgache*—825 kilos, *Up-to-Date*—910 kilos. The yields obtained, after deducting the weight of seed, were: *Malgache* 6·3 metric tons, *Up-to-date* 2·5 metric tons.

(m) Sweet Potatoes

Although the practice of planting sweet potatoes by tubers is unknown in Mauritius, except when a new variety is introduced, it was thought interesting to lay out a small trial at Pamplemousses to ascertain the difference in yield from sweet potatoes planted by cuttings and by tubers. This was planted in November 1948. A severe attack at *Cylas formicarius* reduced yields drastically. Cuttings gave 1,250 kilos per acre tubers 700 kilos.

(n) Local Tomato

Sown at the beginning of April and given the some treatment as tomato sown at the beginning of May, the earlier plantation gave 1·70 tons of fruit as compared with 2·9 tons for the third generation of the hybrid *local* × *Marglobe*. The yield of local tomato in 1947, sown at the beginning of April, was 1·75 tons.

(o) Yams

Under normal conditions yams keep satisfactorily three or four months in Mauritius. They are ready for harvest in July and the practice at our experimental stations has been to replant about October–November. It is not anticipated that yams will ever become sufficiently popular with the population for large scale plantations to be effected. However, a recent feeding test carried out by the Nutrition Officer with the willing cooperation of school children, voted yams an acceptable food, especially when stewed or curried. Other consumers would prefer yams boiled, mashed, fried or as *purées*.

Planting of a few stools every month in summer might produce tubers for the family over a considerable part of the year. With this idea in mind, small observation experiments were made at Pamplemousses and Réduit. In two of these, yams were planted at various times and harvested when ready, in another they were planted at the normal season but reaped earlier than usual,

(i) *Variety Light 55ed—Pamplemousses.*

TABLE II

Planted		7.10.48	21.1.49	21.2.49	21.3.49	21.4.49
Harvested		6. 7.49		8.9.49		
Cycle-days		273	231	200	172	141
Rainfall (inches) ...		35	30	24	15	9
Mean yield/acre (tons) ...		9·9	11·5	8·6	5·4	1·7
%		100	116	87	55	18
%		86	100	75	47	15

(ii) *Varieties : Cush, Oriental, Handeni IV, Lisbon—Réduit.*

TABLE III

YIELD–IN METRIC TONS PER ACRE

Planted	*Harvested*	*Cush*	*Oriental*	*Handeni IV*	*Lisbon*
15.1.49	15.7.49	7·01	6·06	9·28	5·87
15.2.49	5.8.49	2·08	2·08	3·98	2·46
15.3.49	17.8.49	0·38	0·19	0·38	0·37
14.4.49	17.8.49	—	0·28	—	0·18

(iii) Pamplemousses. 56 different varieties planted on 7th October, 1948, and harvested at the beginning of May, June and July.

TABLE IV

NET YIELD IN METRIC TONS PER ACRE

Varieties	*Harvested July (Control)*	*Harvested*	*June*	*Harvested*	*May*
Anguiliala	5·4	8·9	165	6·2	115
Lisbon	5·0	6·5	130	4·3	86
Cush	5·8	4·0	69	4·3	74
Crop	4·9	3·6	73	2·8	57
Oriental	6·6	3·3	50	3·0	45
Sealed top	7·3	5·9	81	3·0	41
B. Neck Lisbon ...	7·3	5·4	74	3·2	43
Kohata Kondol	9.8	6·6	67	3·8	39
Handeni I	15·4	13·9	90	4·9	32
Danish	7·4	6·5	88	2·0	27
Light Red... ...	8·0	6·8	85	2·0	25
Handeni IV	10·1	4·0	39	0·4	4

It is too early to draw definite conclusions from the short series of small-scale experiments so far conducted. When complete data are available final recommendations will be made.

Allotments

The Allotments Relief Scheme has again been administered by the Division. There were only two evictions. As usual, plot holders, who almost all have secured permanent or semi-permanent outside employment, have had to be closely supervised to ensure the satisfactory upkeep of their land. This remark, however, does not apply to the allottees at Moona who are all expert gardeners and who are provided free with irrigation water. The total area under cultivation was 227 acres. As compared with previous years, there was a considerable increase in the number of livestock kept, especially of goats, pigs and poultry. The number of people directly or partially dependent upon such relief as the scheme affords exceeded 700.

Extension Work

Extension work proper was drastically cut down owing to lack of staff. It must be remembered however, that, taking the Department as a whole, the Sugarcane Research Station's field demonstration staff, as well as such allied organisations as the Tobacco Board and the Food Production Board, a considerable amount of such work was in fact accomplished. When the Agricultural Division is reorganised, as it is hoped it will be in the near future, extension will naturally count among its major activities.

Rodrigues

The annual report of the Agricultural Officer stationed in the Dependency is published elsewhere. The principal agricultural question at Rodrigues is the control of erosion and the conservation of water. These are not easy problems to solve, nor can they be solved quite satisfactorily or in a short time. However, an effort was made in the right direction when the officer-designate for posting to Rodrigues, after preliminary instruction under the Senior Agricultural Officer, was sent to Rhodesia for a short study tour in connection with erosion control. In addition, that officer was given special training in Mauritius for the sort of work which he would have to do in the Island. The fruit of such training is already appearing, albeit in a small way.

The Senior Agricultural Officer accompanied the Director of Agriculture on a brief visit to the Dependency early in December.

Other Activities

(i) Courses of lectures in agricultural subjects were delivered to students of the College of Agriculture. Practical classes were held and students accompanied on visits to various places of interest.

(ii) The Senior Agricultural Officer served on a number of Boards and Committees, notably the Forest Board, the Scholarships Committee and the Ancient Monuments Board.

(iii) The three food settlements at St. Martin, St. Thomas and La Ferme were inspected from time to time by Agricultural Officers and advice given to the growers on various matters.

(iv) A bulletin on the Production of Vegetable Seeds in Mauritius was published. A number of articles were also published in the "*Revue Agricole de l'Ile Maurice.*"

Acknowledgment

In concluding this review of the work accomplished during 1949 with a depleted staff, I wish to lay on record my appreciation of the whole-hearted support I have received from all my assistants.

G. A. North Coombes,
Senior Agricultural Officer.

Agricultural Division—Rodrigues

Staff

Mr. L. P. Régnard, Agricultural Officer, arrived in Rodrigues on the 15th July to replace Mr. R. Jauffret who retired on the 20th January.

Mr. P. Guérandel acted as Agricultural Officer during Mr. Jauffret's absence and left for Mauritius by the S.S. *Zambezia* on the 9th November.

Mr. M. Fakim, appointed Overseer Grade I for Rodrigues, arrived on the 15th July to replace Mr. P. Hungley who left by the same ship for Mauritius.

Climatic Conditions

Weather conditions have been abnormal this year, rains were badly distributed and it has been very dry.

The monthly precipitation at Oyster Bay was as follows:—

Months	*Total ins.*	*No. of rainy days*	*Highest rainfall in one day*
January	10·24	13	3·30
February	2·01	7	1·26
March	2·02	14	0.24
April	6·84	22	1·32
May	3·12	10	1·22
June	1.60	15	0·33
July	1·38	12	0·47
August	1·69	17	0·24
September	0·90	14	0·26
October	1.18	13	0·33
November	0·90	9	0·27
December	0·79	8	0·22

General Conditions

Food crops, chiefly maize and sweet potatoes, have yielded very poorly owing to the bad distribution of rains. Larger quantities of maize, rice and flour had to be imported from Mauritius in order to meet the requirements of the population.

Livestock exported by the S.S. *Zambezia* in November fetched rather low prices due to the shortage of food for the animals and towards the end of the month many Rodriguans were asking for work for want of cash to supply their immediate needs.

Experimental Station

(a) Economic crops

(i) *Maize.* The white maize, which the Rodriguans do not favour, has only yielded 363 kilos per acre this year as compared with the local variety which produced 1,050 kilos. The plantation suffered from the drought during the formation of cobs.

(ii) *Beans.* Plantations throughout the island were badly attacked by a caterpillar, at the Station only about 50 per cent of the seeds could be collected for planting material. Amongst the varieties planted, *Pioneer* and *Pistache* gave best results with yields of 566 kilos per acre, the other varieties yielded between 152 and 392 kilos per acre.

(iii) *Phascolus Radiatus.* Results at the Station have been very disappointing due to early planting. A fairly good crop has been obtained over the island.

(iv) *Yams.* No planter so far has shown any interest in this crop. Thirteen varieties have been planted at the Station, and the average yield has been 4,795 kilos per acre.

(v) *Cassava.* Twenty-nine varieties are grown; these have been planted in a field covered by Pois Mascate *(mucuna deeringiana)*, the roots were so bitter that it could not be consumed ; the plantation was not uprooted in order to have cuttings available for supply to planters. A new plot has been laid out for the next season.

(vi) *Sweet Potatoes.* Twenty-eight varieties planted ; these are harvested by digging the roots without disturbing the plant. Yields are not available yet.

(b) Pasture Grasses

Panicum, Chloris Guyana, Melinis, Paspalum notatum and native grasses are all suffering from the drought.

(c) Propagation

Owing to shortage of stocks and pots, only a few citrus and peaches have been grafted so far; these are doing well.

Bread fruit trees are badly affected by cyclones and snails. They should be planted in sheltered places. The Conservator of Forests has agreed to have small patches of these trees planted in Crown Forests. 104 roots have been placed in the Solar Propagator, and 16 plants have already been potted. Others are still sprouting.

(d) Improvements

(i) A propagation shed 34 feet square has been built at the Experimental Station.

(ii) A new orchard is being created for a collection of fruit trees.

(iii) An area of about $\frac{1}{3}$ of an acre has been terraced in order to plant new varieties of citrus imported from Mauritius.

(iv) A banana plantation has been established in a swampy area on the mountain side not far from the water supply.

(e) Sanitation

(i) Three latrines have been built at the Station as accommodation had not been provided for the labourers.

(ii) The roof of the reservoir of the water supply, having caved in, has been rebuilt.

Plant Introduction

(i) Seeds of the following plants have been introduced this year:—

Beass lime	:	9 seedlings raised.
Woglum lime	:	21 seedlings raised.
Rangpur lime	:	13 seedlings raised.
Rough lemon	:	none germinated.
Atemoya	:	1 seedling raised.
Lucuma	:	2 seedlings raised.
Solo papaya	:	almost 100 per cent germination.
Pemba coconut	:	12 plants germinated so far.

(ii) Maize seeds (Golden Beauty) have been introduced from Rhodesia as well as seeds of the following grasses Panicum makaricari, Setaria kazungula and Dactyloctenium aegyptium. These will be sown after the rains.

Stock Farm

The following are raised at the Station:—

(i) CATTLE

Cross-bred Friesland:

Birth: 1 bull calf.

Death: Nil.

Present number: 2 cows, 1 bull calf.

Africander:

Present number: one old cow.

Birth : 1 bull calf.

Death : 1 bull calf.

(ii) DONKEYS

Birth : 2 Jenny foals.

Present number: 3 Jacks, 10 Jennies.

(iii) PIG

Present number: 1 boar.

(iv) POULTRY

(a) Turkeys, American Bronze Breed :

Present number: 2 cocks, 11 hens, 15 chicks.

(b) Rhode Island Red :

Present number: 14 cocks, 17 hens, 10 chicks.

Land Tenure

In Rodrigues, 3,548 acres have been leased to farmers for agricultural purposes and distributed as follows:—

Number of persons leasing areas smaller than one acre	...	...	24
do. do. one acre	...	...	1,611
do. do. more than one acre	...	...	745
Total number of persons registered as leasing lands	...	...	2,380

Total number of cattle posts leased	...	667
Total number of shop sites leased	...	29
Total number of residential leased	...	1,152

Most of the time of the Agricultural Officer is spent in questions dealing with land tenure, visiting sites in remote places and scattered all over the island to find out whether they are suitable for agriculture and also in measuring these lands. The Assistant Surveyor, Public Works Department, is overburdened with his numerous duties and has little time left for surveying. A Sworn Surveyor whose duty would only consist in measuring large areas, including lands previously leased which have not yet been measured would be

of a great value for this island. There are not much good lands left to be leased, except those under trees or acacia, but as far as possible, these are not opened to agriculture. About 50 acres have been distracted from the Cattle Walk this year to satisfy the increasing demand for lands.

Plant Pests

(i) A patch of 'herbe tourterelle' *(Wilkstroemia indica)* has been noticed at Coromandel ; isolated plants have also been seen over a wide area in that locality.

(ii) Lantana is spreading considerably on the southern coast.

(iii) Cadoque *(Caesalpina bonducella)* is noticed in several places in the Cattle Walk.

Soil Conservation

Anti-erosion work could only be started by the end of November owing to lack of funds. Two areas are now being contoured, one at Baie Malgache and the other at Crève Coeur. Stones are plentiful in both localities. Walls two feet high are being built on the level round the contours. In areas where stones are not available, earthern contours or terraces will be built. A small area has already been terraced at the Station at Oyster Bay to see whether they will resist heavy rains.

Cattle Walk

Since July, the drought had already affected the overgrazed pastures in the Cattle Walk ; hardly a blade of grass is left for the cattle to graze on and many are dying in various localities.

Pasture Ridges will be experimented in two localities in order to hold the water and increase the moisture in the soil. If these prove efficient larger areas could be done next year.

P. REGNARD,
Agricultural Officer, Rodrigues.

Veterinary Division

A. Disease Control

Tuberculosis. Ninety nine milk cows and six bulls, together with 738 herd animals, were tested with tuberculin during the year under review.

Only 6 milk cows reacted positively to the test, but the incidence of the disease was generally high on herd animals, and in one particular herd, the percentage of reactors was so high that the whole herd was considered infected. The owner is now attempting to build up another herd free from tuberculosis by segregation of the offspring.

The main object of the tuberculin test on herd animals was to prevent the spread of tuberculosis to the two Braham bulls recently imported from America by a group of estates.

The campaign for the eradication of tuberculosis both amongst milk and herd animals will continue, and it is hoped that in the near future, good results will be achieved.

Contagious abortion. Apart from the Government Dairy, no cases of abortion have been met with.

Mastitis. Many cases of mastitis have been treated with penicillin udder ointment with excellent results.

Deficiency disease. Many animals belonging to the one-cow man were affected with partial or complete paralysis as a result of calcium and phosphorous deficiency. Many cases were sucessfully treated by injections of calcium combined with addition of bone meal in their diet. Advanced and incurable cases were sold to butchers. Cow keepers have been advised to resort to the addition of bone meal in the diet of their cows.

Internal parasites. The main one was parasitic gastro-enteritis in sheep and goats. Many affected animals were successfully treated. Sheep and goats stationed at Flat Island were heavily infected with stomach worms, mortality rate was high. Treatment was resorted to, and is being regularly repeated once monthly. The result is good, and the death rate has decreased to nil.

External parasites. The two main ones to deal with have been the sheep nostril fly and the ticks.

Weekly fumigation, together wih instillation of a nasal oil in affected animals have kept the flies under control.

As far as ticks are concerned, the routine dipping in arsenical solutions have given the usual good results. Experiments with a mixture of gammexane will soon start. It is hoped to control both biting flies and ticks at the same time.

Poultry Diseases. The vaccine against Fowl pox has been received by air from South Africa, and many chicks have been successfully vaccinated with it.

B. Sterility Control

The great incidence of infertility of cows had been for long a matter of grave concern at the Government Dairy.

Many cows and heifers, whilst not pregnant, were not going to the bull at all or else were repeatedly returning to the bull without successful fertilization. In some cases, heifers athough they had attained the age of 5 years had never been on heat at all.

From the breeding point of view, as well as from the economic standpoint, such abnormal conditions undoubtedly called for improvement.

It was assessed, after rectal examination of the genital organs of a first batch of five apparently sterile females, that they were all affected with ovarian cysts, which affected the normal sexual cycle of these animals. Enucleation of the cysts was performed and all the five animals returned normally to the bull. Since then 20 sterile cows and heifers at the Dairy have been successfully treated. Most of these animals are now definitely pregnant as revealed by rectal examination of the genital organs.

Examination of the Semen of the Bulls. The semen of the bulls of the Dairy was regularly tested after collection in the artificial vagina, with the object of assessing whether the bull was not a factor in the cases of the cows repeatedly returning to the bull.

The test showed that in many instances the semen was very clear and on microscopical examination was found either to be entirely devoid of mature spermatozoa, or contain few immature, non-mobile ones.

Treatment of Vitamin C by injection was resorted to with immediate response. The quality of the sperm changed in so short a lapse of time as a week, and returned to normal after 3 or 4 injections.

Routine examination of sperm of all bulls at the Dairy is nowadays being made. This will considerably reduce the chances of unsuccessful service.

Ovulation. Artificial inseminations as well as natural services were usually made in the morning.

With the low rate of conception, this practice was investigated with a view to determining whether the services were made too soon before ovulation.

As from August, the cows were served twice morning and evening, whether by natural service or artificial insemination.

The results consequent upon this new procedure seem to be promising ; out of 16 cows so inseminated, only 4 returned to the bull.

Conclusion. The sterility problem affecting the cows at the Government Dairy was thus tackled from three different angles:—

(a) enucleation of ovarian cysts ;

(b) sperm examination ;

(c) more appropriate time of service.

It is not possible to say precisely how far the fight against sterility has been successful, but the results obtained are very encouraging, and a great step forward has been achieved. Experiments are still going on, and it can be assumed that shortly valuable information will be available.

C. Artificial Insemination

Thirty-one cows from the Government Dairy and ninety cows belonging either to estate dairies or to the " one-cow man " have been artificially inseminated since June this year, date at which the artificial insemination campaign was launched in the districts of Savanne and Grand Port.

At the Government Dairy, our experimental centre, the percentage of successful fertilization on a first batch of 15 cows was very low, i.e., about 25 per cent. These results are to be ascribed to the abnormal sexual cycle of the cows at the Dairy.

However, on a second batch of 16 cows which were artificially inseminated twice the rate of successful fertilization has considerably improved; only 4 cows have been on heat again, thereby giving a percentage of conception of 75.

As regards the privately owned cows, the results achieved have been excellent. Out of the 90 cows artificially inseminated so far only 8 have given signs of heat.

A recent survey made in view of the publication of this report has shown that 75 per cent of the inseminated cows are definitely pregnant. These results compare very favourably with those obtained elsewhere.

Up to now, the one-cow man has made very little response to the artificial insemination scheme ; it is hoped that the results obtained will bear witness to the success of artificial insemination and thus be a great inducement to them, so that in a near future, artificial insemination will be generally accepted, by small and big breeders in the Colony.

D. Slaughter Houses and Meat Inspection

114 visits were made to the abattoirs during which some carcases were seized as unfit for human consumption. Certificates were issued to butchers for the slaughter of 2,326 cows and heifers of the milk breed discarded through injuries sustained or as unfit for reproduction.

E. Importation of Animals

(1) *For meat purposes :—*

From Vohemar	2,566 bullocks
From Australia	1,116 sheep
From Rodrigues	268 bullocks 2,375 sheep and goats 1,117 pigs 16,800 fowls.

(2) *For breeding purposes :—*

From South Africa ...	19 ewes 2 rams
From America ...	2 bulls (Brahman) 4 heifers (Brahman)
From Australia ...	10 heifers of the Milk breed 1 bull (Jersey)

(3) *For racing purposes :—*

From Great Britain ...	30 race horses
From France	3 ,,

(4) *For draught purposes :—*

From Agalega	6 mules
From Diego Garcia ...	16 donkeys 1 mule 4 cobs

F. Quarantine

1. *Kennels.* The following dogs have been imported during the year, and kept in quarantine for 6 months :—

1 bitch and 1 dog—whippet ;
1 dog—Cockers Spaniel ;
1 dog and 1 bitch—Golden Retriever ;
2 dogs—a Basset and a Griffon ;
1 dog—Great Dane ;
1 bitch—Alsatian ;
1 dog—Bleu de Gascogne ;
1 bitch—Pomerian.

During the year, 12 dogs—including those imported towards the end of 1948—were released from the Station in perfect condition. One Great Dane pup, however, died in March, due to a severe enteritis, after having done about 3 months quarantine.

2. *Fort William Quarantine Station.* Three French race horses which were transhipped at Tamatave, and stayed there for some time, had to be quarantined at Fort William Station for a month as anthrax was prevalent in Tamatave. They were handed over to the Turf Clubs in good condition.

Two bulls and four heifers of the Brahman breed were placed under observation in the Station for some days and then delivered to the Stock Breeders Association.

Further, the Station was used to house sheep and goats bought partly in Rodrigues and partly locally for the purpose of observation and treatment before being sent to Flat Island breeding station.

G. Veterinary Education

Lectures on Animal Husbandry, Anatomy and Physiology of farm animals and Veterinary Pathology were given at the Agricultural College to students of the 1st, 2nd and 3rd year as in previous years.

H. General

Assistance and advice concerning every aspect of veterinary science was given to all breeders who called for them. Numerous visits were paid to estates as well as to small breeders by all members of the Division.

I. Staff

The newly appointed Senior Veterinary Officer, Mr. A. Darné M.R.C.V.S. (Lond.),took over charge of the Division on the 9th April. The Veterinary Officer,, Dr. F. E. Lionnet, went on leave on the 1st July pending retirement. From that date, Mr. Y. Lefébure, Assistant Veterinary Officer, acted as Veterinary Officer. In April, Mr. Nadeau was appointed Scientific Assistant.

A. Darné,
Senior Veterinary Officer.

Animal Husbandry Division

At the beginning of the year, the newly arrived Animal Husbandry Officer set about becoming acquainted with local conditions, and the first step in this direction was a quick survey of the fodder position. This led to the drawing up of a pilot scheme for the production of *légume* and grass hay in the Midlands with the object of ultimately supplementing available fodder supplies, particulary in times of scarcity.

The next step was a study of the local livestock, particularly cattle, and in April schemes for the importation of breeding stock and the formation of an animal husbandry extension staff were included in the 1949–50 Estimates.

Research along the following lines was carried out:—

(a) Adaptability of South African-bred Frieslands to conditions obtaining at the Government Dairy;

(b) Crossing them with the local *Créole* milk cow to increase milk production;

(c) Contagious abortion in all its aspects;

(d) Fertility of stabled cows.

2. *Bulls.* The stationing and functioning of all Government bulls became, during the year, the responsibility of the Animal Husbandry Officer.

Thirteen bulls stationed throughout the Island served 877 cows with 139 return services. These services are 173 less than last year. As the Friesland bulls become older and heavier, the cow owners become less and less inclined to risk injury to their small boned animals at service, and turn instead to local half bred sires, sons of the Government bulls. The climate is against retained vigour in pure bred bulls of European breeds, and this, added to lack of exercise, explains the premature sluggishness of the animals. It is proposed to have exercising yards attached to all bull stables. The present bulls will be replaced by pure and three-quaren-breds from the Government Dairy as available.

3. *Artificial Insemination.* This is dealt with in the Senior Veterinary Officer's report.

4. *Palmar Breeding Centre.* It is proposed to start in the near future a stud of milk goats— Surti or Anglo-Nubian, and later pigs.

The cattle there are doing well.

Government Dairy

The Dairy was placed under the direct control of the Animal Husbandry Officer in July.

1. *Milk—*

(a) Total milk produced ... ... 92,498 litres

(b) Average number of cows in milk throughout the year 34

(c) Average yearly production per cow ... ... 2,720 litres

(d) Average daily production per cow ... ... 7·5 litres

This figure shows an increase of 0·6 litre over last year.

Analysis of a composite sample of milk gave the following results:—

Total solids	... ...	12·64%
Fat	... ...	4·5%
S.G. at 15°C	... ...	1·030

The monthly butterfat testing of individual cows was instituted.

2. *Fertility.* The fertility of the herd was so low (60 per cent calving rate in 1948) that ovarian cysts were suspected. Twenty cows and heifers were examined and treated, all of which soon after took the bull with good results.

3. *Contagious abortion.* Contagious abortion is still rife in the herd. All the animals, calves included, were tested and 50 per cent reacted to a greater or less degree. All with a titre of 1/200 and over were isolated and milk from that stable was boiled before leaving the dairy. As a precautionary measure, consumers were advised to boil all milk from the Dairy before use.

There were 5 abortions out of 28 calvings or 17·8 per cent as against 6 per cent in 1948. Two of the aborters were unvaccinated heifers. All heifer calves are being vaccinated with S.19 (anti contagious abortion) between the ages of four and eight months. It is too early yet to judge results.

A special study of the disease is being made.

4. All animals were tested for tuberculosis and the four reactors slaughtered, so that the herd is now " T.B. free."

5. Artificial insemination was successfully carried out on a number of cows.

J. G. S. Bennie,
Animal Husbandry Officer.

Tea Division

General. The year as a whole was favourable for crop, particularly the last quarter.

The high light of the year was the numerous enquiries for Mauritius tea from overseas buyers. About the middle of the year the world price of tea, owing to a shortage, rose steeply and tea has been exported at remunerative prices to the U.K. and South Africa.

The Tea Bill passed its final reading in the Legislative Council on the 20th December, 1949, and is now law. The four small factory owners were informed in June of the steps that are required of them to bring their factories up to modern requirements.

Weather. No cyclone came near enough to Mauritius to cause any damage but the rainfall, due to their effects, I undersand, was heavier than usual for the first quarter, with less sunshine. This reduced crop somewhat, but was more than compensated for by the last quarter, which was dry and favourable for growth.

A rain gauge was installed at Parc-aux-Cerfs in June and the monthly falls from that date were as follows:—

	Inches
June (8th to 30th)	17·37
July	11·72
August	5·96
September	4·33
October	4·51
November	7·88
December	6·32

Parc-aux-Cerfs. Ten acres of land was cleared and planted with seedlings grown from the seed received from Malaya. This area is being kept solely for seed bearers and the plants were spaced $10' \times 10'$ in the part of the area and $6' \times 7'$ in the other half. The difference in the spacing between plants has been done for the purpose of noting the effects of cyclones on seed crop and if the closer planted trees will afford their own protection.

Crown Land Montille. This area produced 2 maunds (164 lb.) of seed in April. Some of the seed was sold to planters and the balance planted in nursery beds at Parc-aux-Cerfs.

Some 40 Accacia decurren seedlings were planted in January. These have grown extremely well and it is hoped to harvest some seed during 1950.

Crown Land Wooton. It was decided to clear and plant 20 acres in this area, 10 acres with seed from Malaya and 10 acres with seed from Crown Land Montille. Clearing of the scrub and trees was started in November and a bull-dozer was engaged to eradicate the roots. The bulldozer, the owner of which was the only one from whom a tender was received, was a D. 4 of 40–45 H.P. It had not sufficient power when confronted with well rooted stumps, particularly Jambrozia. It completed only 7½ acres in all. A considerable amount of top soil is removed with the stumps and unless the tree stumps are very close, which would mean reducing the number of tea plants to the acre, it would be better to leave the stumps in the ground to die and rot naturally.

In part of Crown Land Wooton, the Jambrozia stumps are very close and must be taken out. Further trials will be carried out, and a separate article written on this subject.

Malayan seed. Five maunds of seed from the Boh Plantations Ltd. were received by the S.S. *Boissevain* in December. The appearance of the seed was good and germination has been excellent. This seed is to be used in the Crown Land Wooton clearing.

Tea. Stocks of tea at the factories reached a high level by the end of June, being well 300,000 lb. From then until the end of the year, they showed a sharp decline due to the seasonal drop in crop, less imports of tea from Ceylon and the appreciable amount of tea exported. At the 31st December, the amount in stock was about 150,000 lb. Stocks held by retailers are not taken into account.

Statistics

	Kilos
Local production :—	
1945	174,107
1946	222,556
1947	247,708
1948	280,601
Tea imported :—	
1945	29,554
1946	72,190
1947	77,444
1948	57,657
Tea exported :—	
1947	—
1948	5,841
	Arpents
Acreage in bearing :—	
1948	1,926.90
Planted in :—	
1948	19.81
1949	44.61

Tea seed bearers planted in 1949—9 acres.

Tea Advisory Committee. This Committee met twelve times during 1949, and of the many items discussed, the most important were the Tea Bill, Tea Buying Pool, Propaganda Cess, Reconstruction of Factories, Import Duty on Tea and allocation of land for planting tea.

Assistant Tea Officer. Mr. Brouard left for Ceylon on the 1st February and arrived at Colombo ten days later. He spent 6 months in Ceylon where he lived on two different tea estates, for periods of 3 months in Up-Country and in the Low-Country. Besides this, he visited many other estates and the Tea Research Station several times. This practical experience and living in a Country where the growing and manufacture of tea is the main industry will have given him a grounding which will prove invaluable in the future. Mr. Brouard has written a very interesting account of his experiences in Ceylon.

To round off his education, Mr. Brouard then spent two months (October and November) in Nyasaland to study the production of tea and to compare the methods employed there with those he had seen in Ceylon.

In conclusion, I would say I am convinced that besides the necessary improvement in cultivation that is required to increase the yield of tea in Mauritius, a great deal of crop that could be harvested is lost, owing to poor plucking and too long rounds during the cropping months. One continually sees, when going through the tea areas, leaf on the bushes that should have been picked two, three and four days previously. Labour is the dominant factor and I am sure camps to provide sufficient quarters for the number of Labourers that are required on the plantation all the year round is the only satisfactory answer.

F. O. SPRINKS,
Tea Officer.

Tobacco Research Station

Weather Conditions. Except for the months of February and June, the season was unusually dry, the rainfall being one of the lowest recorded since the station opened. The supply of irrigation water from La Ferme Reservoir was lower and more irregular than in the preceding years and the situation was rendered more difficult by the fact that the area under crop had increased threefold in the course of the four last years. The Public Works Department had already started work on the main distributary canal of La Ferme and it is hoped that the water supply will improve in the near future.

The tobacco crop was planted earlier than in the preceding years. The Amarello was planted in January, the Virginian flue-cured varieties in February and the Hybrids in March. Apart from a hot dry spell of weather following the Amarello plantation, growing conditions were on the whole favourable and the yields were the highest obtained at the station. The preparation of the field planted with Burley was not completed before April owing to severe infestation by the weed " Chiendent " (*Cynodon dactylon*, Pers.) and this variety made rather poor growth during the subsequent months.

The month of June was exceptionally wet, and a severe attack of mildew developed in all the plantations and persisted throughout the months of July and August.

The meteorological statistics for the year are as follows: —

RAINFALL

Months	No. of rainy days		Inches	
	1949	Mean 1939–48	1949	Mean 1939–48
January	14	10·9	2·00	4·39
February ...	15	11·5	9·24	5·84
March	16	12·3	2·91	6·31
April	13	9·7	1·41	4·26
May	3	7·5	0·09	1·42
June	13	7·9	2·66	0·84
July	9	9·4	0·71	1·15
August	5	7·4	0·64	0·48
September ...	4	7·4	0·09	0·79
October ...	6	3·7	0·37	0·65
November ...	6	6·1	1·31	1·83
December ...	10	9·7	2.49	4·71
	114	103·5	23·93	32·65

TEMPERATURE—°FAH.

Months	Mean				Absolute				Mean Relative Humidity	
	1949		1942–48		1949		1942–48		1949	1942–48
	Max	Min	Max	Min	h.*	l.	h.	l.		
January ...	83	78	85·1	76·9	91	70	91	70	64·2	64·20
February ...	84	77	85·4	76·9	91	70	93	67	67·7	64·79
March	84	77	84·4	77·0	89	68	91	67	64·0	68·31
April	82	77	82·1	75·4	87	70	88	62	67·7	67·51
May	81	72	79·7	72·0	86	65	90	60	67·1	66·20
June	77	71	76·9	69·1	84	63	83	57	66·6	64·91
July	73	65	75·4	68·1	83	58	82	58	70·2	64·57
August	76	68	75·9	67·7	80	59	82	55	61·9	64.67
September ...	77	70	76·7	68·3	82	62	84	56	58·5	60·89
October ...	79	71	79·1	70·6	85	62	87	60	55·6	57·24
November ...	81	73	82·1	72·3	87	65	88	62	56·2	58·40
December ...	85	76	84·1	75·3	90	67	90	66	57·0	62·36
	80	73	80·6	72·5	91	58	93	55	63·1	63·67

* Read *highest* for *h.* and *lowest* for *l*

Diseases

The routine method of control against seed-bed diseases, the chief of which are damping off (*Phytium de Barryanum*, Bary) (*Rhizoctonia solani*, Zuln) and frog eye (*Cercospora nicotianae*, Ell. and Ev.) comprises, in addition to general sanitation measures, the partial sterilization of the beds by brushwood fire at least two weeks before sowing, applications of cheshunt compound prior to sowing and afterwards at fornightly intervals and sprayings with Bouisol. With the above precaution the seed-bed diseases are of slight occurrence. Disease occurs more frequently in the slow growing beds. In such cases, applications of sulphate of ammonia, dissolved in the watering can, have marked beneficial effects.

The incidence of Black Shank disease (*Phytophtora nicotianae*, Breda de Haan) (*P. parasitica*, Dart: emend: Ashby) in the fields were remarkably lower than in the preceding years. The Amarello was very resistant and the stand of the more susceptible Virginian varieties was exceptionally good. Breeding for resistant varieties and careful use of irrigation water are the two chief causes to which the above results are ascribed. When irrigation is started too early, infestation by Black Shank is generally very severe. Discriminate watering should be continued for a month after planting, the ridges gradually built up and irrigation of interrows introduced gradually and lightly afterwards. The process of hand-watering is very expensive under present labour conditions and a system of overhead irrigation such as the rotary rainer would certainly prove very economical and efficient.

Mildew (*Oidium Tabaci* D.C.) was a very serious disease during the months of June to August. The Amarello and the Burley types were in general less susceptible to mildew than the Virginian varieties. The Rg. (a cigar wrapper variety resistant to Back Shank disease introduced from Florida, U.S.A. in 1945) and its hybrids were the most severely affected. Consequently a great amount of leaf was lost, and the grade of leaf cured after June was very low. The yield and grade index figures of all field experiments were seriously affected and rendered unreliable. The weight of green leaf harvested from the various experimental plots is therefore taken as giving a better estimate of the yields.

Insect Pests

Cut-worms caused considerable trouble in seed-beds, more particularly in those which had no cheese-cloth covers. Spraying with lead arsenate proved effective in the case of leaf attack by young worms. In beds where large cut-worms were present, spraying with wettable D.D.T. was very effective in controlling the pest.

Gammexane applied along the inside perimeter of the beds at the time of sowing gave very good protection against red ants during germination. The leaf miner and the bud worm caused some damage to the young plants in the fields. Control experiments with Gammexane and D.D.T. were continued.

Nematodes (Hetedora marioni-cornu) infection was low in the Amarello and Burley fields. Tobacco planted after sugarcane for the first time at the station showed considerable root infection. The possible effect of sugarcane on the Nematode population of the soil should therefore be carefuly watched.

Plant Breeding—*Amarello section*

1 *Amarello Pointed Leaf Trial.* The best selections of each of the four more desirable strains of the preceding year's trial, two selections made on tobacco growers' estates, two mass selections and one selection of Amarello broad leaf were tested for yield and quality in a randomised block experiment with four replications (Plots were 1/75 acre). All plots received the equivalent of 24 kg. nitrogen, 40 kg. phosphoric acid and 25 kg. potash in the form of suphate of ammonia, superphosphate and sulphate of potash. Seed was sown on 13th December, 1948, and the experiment planted on the 18th January, 1949, on a dull rainy day. For about a month after planting the weather was hot and dry and although the experiment was hand-watered four times a day, a rather large number of plants died. When rain started in the middle of February, the plants established were already of fair size and recruiting at this stage would have resulted in an uneven plantation.

The harvest of Am. 5–48, Am. 2–43–I–I–I–2–3, Am. I–45–I–2–3, Am. M.I–45–I–2, Am. M.48 was almost completed before the 6th priming which was done on the 21st May, 1949, but the strains Am. I–47–2, Am. 2–47–2, Am. K.48, Am. 9–48 were not completely harvested before the 15th July, 1949.

The results of the experiment are tabulated hereunder:—

Strain No.	*Strains*	*Origin of Selection*	*Wt. of green leaf harvested Hgm/plot ± 19·4*	*No. of plants harvested in 4 plots Total possible 192 ± 7·0*	*Grade Index of first 6 primings ± 5·0*
1.	Am. 2–43–I–I–I–2–3	Am. Trial 1948...	244	140	352
2.	Am. I–45–I–2–3	,, ...	226	125	338
3.	Am. I–47–2	,, ...	302	159	365
4.	Am. 2–47–2	,, ...	288	137	362
5.	Am. 9–48	Flacq ...	406	174	365
6.	Am. K–48	Triolet ...	333	170	364
7.	Am. M.I–45–I–2	Am. Trial 1948	243	140	359
8.	Am. M.48	Progeny plots	278	156	353
9.	Am. 5–48	Broad leaf ...	307	161	374
		Mean	292 ± 6·5	151·3 ±2·4	359 ±1·7
			%	%	%
	Cœfficient of variation		13·3	9 3	2·8
	Significant difference (5% point) ...		56·6	20·5	14 6

Results :—(Significant differences 5% point)

Yields :— 5 better than 6,9,3,4,8,1,7,2
6 ,, 9 etc.
9,3 ,, 4 ,,
4,8 ,, 1 ,,
1,7 ,, 2 ,,

No. of plants harvested :
5,6,9 better than 7,1,4,2
3 ,, 4,2
8 ,, 2

Grade index :
9 better than 7,8,1,2
3,5,6,4,7 ,, 2

2. *Amarello Broad Leaf Trial.* The progeny of five selections of Amarello broad leaf, of one mass selection, and of two selections of Amarello pointed leaf were included in the experiment for comparison of yield and quality. Design, fertilisers and dates of sowing and planting were the same as for the preceding experiment.

The results are summarised as follows:—

Strain No.	*Strain*	*Origin of selection*	*Wt. green leaf harvested Hgm/plot ±18·2*	*No. of plants harvested in 4 plots. Maximum 192 ±4·1*	*Grade Index of 1947 primings ±7·8*
1.	Am. 5–48 ...	Sel. 1948	278	176	374
2.	Am. 7–48 ...	,,	304	182	355
3.	Am. 22–38 ...	,,	316	183	360
4.	Am. 25–48 ...	,,	310	174	367
5.	Am. 27–48 ...	,,	299	180	367
6.	Am. B–48 ...	Mass Sel.	267	172	354
7.	Am. K–48 ...	Triolet	319	174	354
8.	Am. I–45–1–2–3	Am. Trial 48	171	144	337
Mean :			283±6·4	173±1·4	359±2·7
Coefficient of variation			12·8%	4·8%	4·3%
Significant difference (5% point)			53·4	12·1	none

Results :—

Stand and Yield of Am. I–45–I–2–3 significantly less than those of the others.

3. *Amarello Fertiliser Experiment.* This was a repetition of the experiment of the preceding year. The same design and size of plots were adopted, but the levels of fertilizers were altered as follows:—

Nitrogen levels	*Phosphate levels*	*Potash levels*
N_1 = 16 kg N per acre	P_1 = 32 kg P_2O_5 per acre	K_1 = 12 kg K_2O per acre
N_2 = 24 ,,	P_2 = 40 ,,	K_2 = 18 ,,
N_3 = 32 ,,	P_3 = 48 ,,	K_3 = 24 ,,

All the fertilisers were applied on the 11th January, 1949, in two bands 2 inches deep on each side of the row, the bands being about 6 inches apart. The experiment was planted on the 18th January, 1949. Dry weather conditions prevailed for a month and many plants died in consequence. The results, tabulated hereunder, show no significant differences for yield or grade index between treatments but indicate that the higher levels of nitrogen have a depressing effect on the stand.

Weight of green leaf harvested Hgm. per plot ± 47·9

n_1	n_2	n_3	k_1	k_2	k_3	Mean ±27·7
P_1 ..551	611	630	597	583	612	597
P_2...638	590	621	558	631	660	616
P_3...502	560	571	535	561	538	545
Mean : ±27·7 564	587	607	563	592	603	585 ±16·0

Hgm. per plot ±47·9

	k_1	k_2	k_3	Mean ±27·7
N_1	508	583	599	564
N_2	596	556	609	587
N_3	586	635	601	607
Mean : ±27·7	563	592	603	586

No. of plants harvested per plot. (Total possible 96)
±2·83

	N_1	N_2	N_3	K_1	K_2	K_3	*Mean* ±1·63
P_1	76·2	77·0	70·7	74·0	73·5	76 3	74·6
P_2	78·8	72·0	69·8	72·8	75·8	72·3	73·7
P_3	76·0	73·3	68·0	71·5	70·5	75·3	72·4
Mean ±1·63	77·0	74·2	69·5	72·8	73·3	74·7	73·6 ±·94

±2·83

	K_1	K_2	K_3	Mean ±1·63
N_1	76·0	78·2	76·8	77·0
N_2	70·0	73·5	79·2	74·2
N_3	72·3	68·2	68·0	69·5
Mean ±1·63	72·8	73·3	74·7	73·6

Grade index of 1st 6 primings ±7·33

	N_1	N_2	N_3	K_1	K_2	K_3	*Mean* ±4·23
P_1	350	347	340	348	341	347	346
P_2	353	350	345	352	347	349	349
P_3	353	344	355	349	352	351	351
Mean ±4.23	352	347	347	350	347	349	349±2·44

±7·33

	K_1	K_2	K_3	*Mean* ±4·23
N_1	354	354	348	352
N_2	343	342	356	347
N_3	352	344	344	347
Mean ±4·23	350	347	349	349 ±2·44

4. *Amarello Selection.* The progeny of the best selections of 1948 were planted in the Amarello trials and in the progeny plots of 1949. About 100 plants were selected in the various strains. The leaf of each selection was cured and examined separately. Provision was made for obtaining seed from each selection, the flower-heads being bagged so as to prevent cross-pollination. The selected plants were finally uprooted and the percentage of roots infected with Black Shank or nematode was noted. After taking into consideration the results of the two Amarello trials, one selection from each of the best strains was retained.

Mass selection was carried out in the progeny plots and a good supply of seeds was obtained for distribution to tobacco growers in 1950.

Flue-cured Variety Section

1. *Flue-cured Variety Trial.* The object of this experiment was to test for yield and quality sixteen strains of various varieties, comprising three from Florida U.S.A., Canada and Southern Rhodesia which have been grown and selected for a number of years at the station, two station strains of each of 6 established varieties and one strain of Amarello.

The balanced incomplete blocks design with 5 replications was adopted, the plots being 1/134 acre. Sulphate of ammonia, superphosphate and sulphate of potash were applied at the rates of 16 kg. N, 40 kg. P_2O_5 and 6 kg. K_2O per acre to all plots except the Amarello which received the same fertiliser treatment as the Amarello Trials. The experiment was planted on 23rd February, 1949, after a good rain. Unfortunately the water-supply from La Ferme was interrupted for a week following the plantation, and water pumped from the well was barely sufficient for one watering per day.

The results of the experiment are shown hereunder:—

No.		*Sets*	*Adjusted Values*		
			Wt. of green leaf harvested per plot Hgm.	*No. of plants harvested per plot out of 54*	*Grade Index of 1st 4 primings*
		x, y			
1.	Am. 1-45-1-2-3	4,2	342	49·7	313
2.	Oxf. 1/3-47-10	1,2	229	50·2	225
3.	Bo. 68N/1-46-1-2	2,4	160	42·3	351
4.	BoR 1-47-2	4,4	160	42·7	223
5.	BoA 7-45-1-3-4	3,3	184	43·7	348
6.	Bo Mass 48	1,3	178	43·0	314
7.	JW 532-195-5-1-3-2-8 ...	1,1	162	42·3	345
8.	JW Mass 48	2,1	189	45·3	313
9.	VB 4-47-2	4,3	187	45·3	321
10.	VB Mass 48	2,3	174	40·2	302
11.	WM-45-2-1-1	3,2	178	41·9	297
12.	WM Mass 48	3,4	197	47·1	298
13.	YM 3-47-7	1,4	233	51·6	292
14.	YM Mass 48	4,1	250	47·9	275
15.	WO 3-45-5-1-1	2,2	141	38·4	318
16.	WO Mass 48	3,1	181	46·6	329
	Mean		197	44·9	304
Coefficient of variation			20·2%	2·8%	7·4%
Significant differences 5% point between 2 varieties having :—					
	One set in common		57·0	1·8	32·2
	Different sets		76·1	2·4	43·0

RESULTS :—

YIELDS—

1 better than 14, 13, 2, 12, 8, 9, 5, 16, 6, 11, 10, 7, 3, 4, 15
14 ,, 8
13 ,, 10
2 ,, 7

STAND—

13 better than 1, 14, 12, 16, 8, 9, 5, 6, 4, 7, 3, 11, 10, 15
2 ,, 14 ; etc. 1 better than 12 etc.
14, 12 ,, 8 ; etc. 16 ,, 5 etc.
8, 9 ,, 6 ; etc. 5 ,, 11 etc.
6, 4, 7, 3 ,, 10 ; etc. 11, 10 ,, 15 etc.

GRADE INDEX—

3 better than 16, 6, 1, 8, 10, 12, 11, 13, 14, 2, 4
5 ,, 6,
7 ,, 10,
16 ,, 11
9, 15, 6, 1, 8 ,, 14
10, 12, 11, 13, 14 ,, 2, 4

The yield of Amarello was, as usual, much larger than those of the other varieties. Oxford 1, a Black Shank resistant variety with Rg. blood imported from Florida in 1946, is slow-ripening and the cured product had a slight greenish tinge.

(2) *Bonanza Fertiliser Experiment.* The object of this experiment was to test the effect of the three standard fertilisers, each at three different levels, on the yield and quality of a Virginian flue-cured variety. The design adopted was the factorial $3N \times 3P \times 3K$, (Tech. Com. No. 35 Yates pp.42–46) with two replications, the plots being 1/75 acre.

The fertiliser levels were:—

N_1= 8 kg N per acre P_1=32 kg P_2O_5 per acre : K_1= 6 kg K_2O per acre
N_2=16 ,, P_2=40 ,, : K_2=12 ,,
N_3=24 ,, P_3=48 ,, : K_3=18 ,,

The fertilisers were applied—band placement—on the 16th February, 1949, and the experiment planted on the 24th February, 1949. The results are tabulated hereunder. There were no significant differences between treatments.

Weight of green leaf harvested—Hgm. per plot ±36·3

	N_1	N_2	N_3	K_1	K_2	K_3	*Mean* ±21·0		K_1	K_2	K_3	*Mean* ±21.0
P_1 ...	328	403	389	380	386	354	373	N_1 ...	370	344	352	356
P_2 ...	367	407	374	380	367	402	383	N_2 ...	396	436	396	410
P_3 ...	372	419	495	393	469	423	429	N_3 ...	387	442	430	420
±21·0	356	410	420	384	407	393	384 ±12·1	±12·1	384	407	393	384

No. of plants harvested per plot (out of 96) ±2·0

	N_1	N_2	N_3	K_1	K_2	K_3	*Mean* ±1·2		K_1	K_2	K_3	*Mean* ±1·2
P_1 ...	83·3	85·7	82·5	83·7	82·2	85·7	83·8	N_1 ...	85·8	83.7	85·2	84·9
P_2 ...	85·2	85·5	82·8	83·7	82·7	86·2	84·5	N_2 ...	85·2	86·3	85·8	85·8
P_3 ...	86·2	86·2	89·5	86·0	86·8	87·0	87·3	N_3 ...	83·3	83·7	87·8	84·9
±1·2	84·9	85·8	84·9	84·8	84·6	86·3	85·2 ±0·7	±1·2	84·8	84·6	86·3	85·2

Grade index ±9·5

	N_1	N_2	N_3	K_1	K_2	K_3	*Mean ±5·5*		K_1	K_2	K_3	*Mean ±5·5*
P_1 ...	322	323	327	336	329	307	324	N_1 ...	331	344	311	329
P_2 ...	334	332	323	317	335	337	330	N_2 ...	313	343	344	333
P_3 ...	331	345	341	317	357	346	339	N_3 ...	326	330	335	330
±5·5	329	333	330	323	339	330	331 ±3·2		323	339	330	331

(3) *Flue-cured variety selection.* Selected strains of the varieties Bonanza, Jamaica Wrapper, Virginia Bright, White Mammoth, Yellow Mammoth and white Stem Orinoco were planted in progeny plots, the two first-named varieties occupying half the area. The stand of the Yellow Mammoth was very high, and all the varieties gave good yields of good quality tobacco. The flower heads of the best plants were bagged, and the seed finally collected from the healthy plants of each variety was bulked and graded for distribution to tobacco growers. The following quantities of clean seed were obtained:—

Variety	*Weight in gm.*
Bonanza	3,110
Jamaica Wrapper	805
Virginia Bright	480
White Mammoth	695
Yellow Mammoth	815
White Stem Orinoco ...	770
TOTAL ...	6,675

Line selection was continued in the various varieties, the object sought being improved yields, quality and resistance to disease. About 10 selections were made in each of the strains planted in the variety trial and progeny plots, the Selection technique being as described in the section of Amarello selection. The leaf of the best selections was kept for performing tests for flavour and aroma.

Small plots of nine other varieties were planted for further selection work. Some of these varieties have now reached the stage when they could be included in the variety trial.

Hybrid Section

(1) Black Shank Resistance Trial. The progeny of selections made in the trial of the preceding year was planted in the experiment. 23Rg. hybrids (Rg. is a Black-Shank resistant cigar wrapper variety imported from Florida, U.S.A. in 1945) and 13 varieties were planted on the 21st March, 1949, in a lattice design with 4 replications. Plots were 1/300 acre (two rows of 12 plants each).

The plantation was watered for a month, after which irrigation was started. Growth was good, the Rg. hybrids showing considerable vigour. A severe attack of mildew started in June and the Rg. hybrids were the most affected.

The results are tabulated hereunder:—

No.	Strain	Parentage	Generation	Sets x	Sets y	Adjusted values (a)	(b)	(c)	(d)
1	S 3a-46-1-2-7	Bo × Rg.	F 4	1,3		100·6	86·5	22·4	169
2	S 9-46-2-3-4	VB × Rg	F 4	4,5		98·7	73·2	22·3	194
3	S 12-47-2-4	Rg × VB × Rg	F 3 of B.C.	3,1		59·7	87·7	14·1	272
4	S 13-46-1-6-6	WM × Rg	F 4	5,2		133·7	73·6	23·4	254
5	S 16-47-1-6	Rg × WM × Rg	F 3 of B.C.	5,4		111·7	87·7	21·6	226
6	S 20-46-1-3-9	Rg × YM	F 4	6,5		133·2	67·1	23·6	266
7	S 20-47-5-1	Rg × YM × Rg	F 3 of B.C.	5,3		93·3	80·9	21·7	141
8	S 21-46-1-6-6	WO × Rg	F 4	4,2		125·4	81·9	21·6	230
9	S 22-47-4-6	Rg × WO × Rg	F 3 of B.C.	3,2		146·9	57·5	24·3	203
10	S 25-46-1-2-3	Amp × Rg	F 4	5,6		105·7	39·8	21·3	192
11	S 25-47-3-8	Amp × Rg × Amp	F 3 of B.C.	1,2		181·2	29·0	22·4	255
12	S 26-47-5-7	Rg × Amp × Rg	F 3 of B.C.	6,6		155·4	46·2	22·8	204
13	S 27-47-3-4	Amb × Rg × Amb	F 3 of B.C.	5,5		159·8	20·5	23·4	254
14	S 28-46-1-6-7	Rg × Amb	F 4	2,3		196·7	65·8	23·2	229
15	S 28-47-5-2	Rg × Amb × Rg	F 3 of B.C.	2,2		165·2	33·1	23·7	150
16	S 32-47-4-1	Rg × Bo × Rg	F 3 of B.C.	2,4		123·9	80·6	22·8	165
17	S 33-46-1-4-1	JW × Rg	F 4	1,5		83·6	81·8	21·6	186
18	S 34-47-2-3	Rg × JW × Rg	F 3 of B.C.	6,2		134·7	71·4	22·4	153
19	S 38-46-4-5	Rg × WP	F 3	5,1		108·0	69·1	23·2	171
20	S 40-46-1-6	Rg × WL	F 3	1,6		99·2	85·4	22·5	120
21	S 42-46-2-2	Rg × HP	F 3	2,6		97·8	96·2	21·3	229
22	S 43-46-4-5	YP × Rg	F 3	6,1		131·2	76·7	21·7	288
23	S 45-46-3-5	WAm × Rg	F 3	4,4		139·2	88·3	23·3	248
24	Oxford 1	—		4,3		124·7	83·5	23·7	218
25	Oxford 3	—		6,3		106·5	85·0	23·0	186
26	Florida 301	—		3,4		122·6	79·1	24·7	149
27	Rg	—		4,1		124·5	57·0	23·9	95
28	Bonanza	(Bo)		3,6		68·8	75·6	18·1	248
29	Jamaica Wrapper	(JW)		3,3		60·9	78·7	18·1	275
30	Virginia Bright	(VB)		6,4		98·7	86·3	22·3	282
31	White Mammoth	(WM)		1,1		85·3	93·3	19·2	270
32	Yellow Mammoth	(YM)		3,5		132·2	84·1	23·7	260
33	White Stem Orinoco	(WO)		2,5		64·7	85·8	16·4	286
34	Amarello pointed	(Amp)		2,1		185·9	22·5	21·7	321
35	Amarello broad	(Amb)		1,4		230·0	36·6	22·8	288
36	White Amarello	(WAm)		4,6		32·6	97·9	7·2	250
	Mean					120·	70·8	21·6	220
	Coefficient of variation					19·3%	18·6%	11·0%	16·1%

	(*a*)	(*b*)	(*c*)	(*d*)
Significant difference 5% point between 2 strains :—				
Same set	35.5	20.0	3.62	53.8
Different set	37.9	21.4	3.86	57.5

Read in columns " adjusted values ".

Wt. of green leaf harvested Hgm/plot — For (*a*)

Mean % foot infection (Black Shank) — For (*b*)

Plants harvested per plot out of 24 — For (*c*)

Grade index 1st three primings — For (*d*)

(2) *Hybrid Trial I.* Six homozygous hybrids from the preceding year's trials and two parent varieties were tested for yield and quality. The design was the latin square, the plots being 1/75 acre. The experiment was planted on the 7th April, 1949. The growth of the hybrids was more vigorous than that of their parents, but the hybrids suffered so severely from mildew that no information could be obtained about the quality of the cured leaf.

The results are tabulated hereunder:—

No.	*Strain*	*Parentage*	*Generation*	*Wt. of green leaf Hgm/Plot* ±38·6	*No of plants harvested out of 96* ±2·46
1	X4–41–1–2–2–1–5–7 ...	Bo × Am	F7	473	91·2
2	X5–41–2–2–3–5–1–5 ...	Bo × Am	F7	653	74·7
3	X4–42–5–12–2–2–20 ...	Bo × Am × Bo	F6 of B.C.	769	72·6
4	X6–42–1–3–3–3–1 ...	Bo × Am × Am	F6 of B.C.	800	80·4
5	X10–42–1–3–1–2 ...	Bo × Am × Bo	F5 of B.C.	715	77·7
6	X11–42–1–1–3–1–3 ...	Bo × Am × Am	F6 of B.C.	919	83·7
7	Bonanza			330	63·2
8	Amarello pointed ...			808	77·4
	Mean			684 ±13·6	77·6 ±0·87
	Coefficient of variation			15·9%	8·98%
	Significant difference 5% point			110·2	7·03

RESULTS :—

YIELDS—

6 better than 8,4,3,5,2,1,7
8,4,3 ,, 2,1,7
5,2 ,, 1,7
1 ,, 7

STAND—

1 ,, 6,4,5,8,2,3,7
6 ,, 2,3,7
4 ,, 3,7
5,8,2,3 ,, 7

X4–41 must be rejected on account of undesirable vegetative characteristics. Ten selections were made in each of the five other hybrids, and smoking tests will be carried out with the leaf of these selections.

(3) *Hybrid Trial II.* Of the F1 hybrids of Amarello and 12 other varieties planted with the Hybrid Trial III 1948, those with Oxford 1, Oxford 3 and Florida 301 blood were much more vigorous and resistant to disease than the others. These hybrids were back-crossed to their female parent varieties and the progeny of some selection and back-crosses were planted in this year's trial together with the varieties Bonanza and Amarello pointed leaf. The trial was planted on the 28th March, 1949.

From the start, the growth of the hybrids was very vigorous. Considerable segregation was in evidence in all hybrids, the majority of the plants being of intermediate types. The plants nearest to the Amarello types were back-crossed to the Amarello parent and those of Oxford 1 and Oxford 3 types were back-crossed to these parent varieties.

The leaf of the Florida hybrids were thin, slow maturing and cured with a very pronounced greenish tinge. All hybrids suffered severely from mildew.

Results of yields of green leaf and number of plants harvested are given in the table below. The design of the experiment was the balanced incomplete blocks, with 5 replications and plots 1/300 acre.

				Adjusted values	
No.	*Strain*	*Parentage*	*Generation*	*Wt. of green leaf harvested Hgm/plot ±13.3*	*No. of plants harvested out of 24 ±0·8*
1	V 37–47–1 ...	Oxf 1 × Amb	F 2 ...	161	21·8
2	V 40–47–1 ...	Amb × Oxf 1	,, ...	148	20·4
3	V 46–47–1 ...	Oxf 1 × Amp	,, ...	152	20·3
4	V 43–47–1 ...	Amp × Oxf 1	,, ...	168	22·5
5	V 37–48 ...	Oxf1 × Amb × Oxf 1 ...	F 1 of B.C.	148	23·9
6	V 40–48 ...	Amb × Oxf 1 × Amb ...	,, ...	123	20·1
7	V 43–48 ...	Amp × Oxf 1 × Amp ...	,, ...	185	20·1
8	V 46–48 ...	Oxf 1 × Amp × Oxf 1 ...	,, ...	151	21·1
9	V 38–47–1 ...	Oxf 3 × Amb	F 2	142	21·6
10	V 47–47–1 ...	Oxf 3 × Amp	,,	200	22·4
11	V 38–48 ...	Oxf 3 × Amb × Oxf 3 ...	F 1 of B.C	155	23·9
12	V 47–48 ...	Oxf 3 × Amp × Oxf 3 ...	,, ...	131	21·4
13	V 39–48 ...	Fr × Amb × Fr	,, ...	83	19·8
14	V 48–48 ...	Fr × Amp × Fr	,, ...	121	22·8
15	Bonanza ...			92	17·9
16	Amarello pointed leaf ...	... ...	...	166	18·1
	Mean (of 80 plots) ...	... ...	...	145·4 ±3·3	21·1 ±0·2
	Coefficient of variation...	... ...	...	20·5%	8·5%
	Significant differences between means of five plots		...	38·2	2·28

Significant results (5% points)

YIELD :

10 better than 1,11,3,8,5,2,9,12,6,14,15,13
7 ,, 9, etc.
4,16,1 ,, 6, etc.,
11,3,8,5,2,9,12 ,, 15,13
6,14 13

STANDS :

11,5 better than 9,12,8,2,3,6,7,13,16,15
14 ,, 2
4 ,, 6
10 ,, 7
1,9,12,8,2 ,, 16,15
3 ,, 15

(4) *Hybrid Trial III.* The 1948 trial was repeated. 42 F1 hybrids of Amarello and nine varieties were tested with some of the parent varieties for yield and quality. The design was the lattice, with four replications, and plots of 1/300 acre. The experiment was planted on 10th March 1949. All hybrids, especially the Oxford 1, Oxford III and Florida 301, displayed considerable vigour.

The results are tabulated hereunder:—

No.	Strain	Parentage	Sets x, y	Adjusted Values: Wt. of green leaf harvested per plot Hgm.	Adjusted Values: No. of plants harvested out of 24
1.	V 1–48	Bo × Amp	3,2	108	12·5
2.	V 2–48	Amp × Bo	6,5	131	15·9
3.	V 3–48	JW × Amp	1,2	129	17·3
4.	V 4–48	Amp × JW	7,7	139	15·4
5.	V 5–48	VB × Amp	7,1	133	17·7
6.	V 6–48	Amp × VB	6,3	242	24·8
7.	V 7–48	WM × Amp	3,6	124	15·5
8.	V 8–48	Amp × WM	2,3	146	17·0
9.	V 9–48	YM × Amp	3,4	168	18·7
10.	V 10–48	Amp × YM	7,5	138	17·8
11.	V 11–48	WO × Amp	5,7	125	15·1
12.	V 12–48	Amp × WO	6,7	131	18·4
13.	V 13–48	Bo × Amb	7,6	179	19·0
14.	V 14–48	Amb × Bo	2,1	196	20·7
15.	V 15–48	JW × Amb	7,3	145	17·0
16.	V 16–48	Amb × JW	4,1	181	19·6
17.	V 17–48	VB × Amb	7,4	176	17·0
18.	V 18–48	Amb × VB	2,2	173	18·0
19.	V 19–48	WM × Amb	3,1	163	18·2
20.	V 20–48	Amb × WM	6,1	187	20·7
21.	V 21–48	YM × Amb	4,4	193	19·2
22.	V 22–48	Amb × YM	3,3	201	20·2
23.	V 23–48	WO × Amb	4,6	169	20·5
24.	V 24–48	Amb × WO	6,6	155	17·6
25.	V 25–48	Oxf 1 × Amp	4,7	231	24·3
26.	V 26–48	Amp × Oxf 1	3,5	193	22·8
27.	V 27–48	Oxf 3 × Amp	7,2	208	22·2
28.	V 28–48	Amp × Oxf 3	1,7	207	23·7
29.	V 29–48	Fr × Amp	5,1	179	22·5
30.	V 30–48	Amp × Fr	2,7	194	23·4
31.	V 31–48	Oxf 1 × Amb	3,7	255	23·6
32.	V 32–48	Amb × Oxf 1	1,4	240	22,8
33.	V 33–48	Oxf 3 × Amb	1,6	244	24·1
34.	V 34 48	Amb × Oxf 3	1,3	258	24·6
35.	V 35–48	Fr × Amb	2,6	242	23·8
36.	V 36–48	Amb × Fr	5,3	249	24·0
37.	V 51–48	Amp × Bo	6,2	191	19·8
38.	V 52–48	Bo × Amp	4,5	178	21·0
39.	V 53–48	Bo × Amp	4,2	130	15·9
40.	V 54–48	Amp × Bo	5,4	153	16·5
41.	V 55–48	Bo × Amb	5,2	201	23·7
42.	V 56–48	Amb × Bo	5,5	150	19·9
43.	Bo		6,4	49	8·8
44.	JW		4,3	100	12·7
45.	VB		1,5	88	15·9
46.	Oxf 1		1,1	143	23·0
47.	Oxf 3		2,5	130	22·1
48.	Amp		5,6	190	21·3
49.	Amb		2,4	262	23·2
Mean				173·5 ± 1·75	19·59 ± 0·18
Coefficient of variation				14·1%	12·8%
Significant difference between means of hybrids having one set in common				36·6	3·77
	no set in common			38·8	4·00

Yield and Stand are very closely correlated, the correlation coefficient being 0·868.

Air-cured Variety Section

(1) *1948 Burley Trials.* One ounce of White Burley seed was received from the Agricultural Officer, Petauke, Northern Rhodesia on the 17th September, 1948. The seed was sown on the same day and the following trials *(a)* and *(b)* were planted on the 6th November, 1948.

(a) White Burley Fertiliser Experiment. This was a $3N \times 3P \times 3K$ factorial experiment intended to determine the optimum levels of the three standard fertilisers for Burley tobacco. The design was the single replication (Tech. Com. Yates pp. 53–57) with plots 1/150 acre. The fertiliser levels were:—

$N_1 = 12$ kg N/acre	$P_1 = 24$ kg P_2O_5/acre	$K_1 = 6$ kg K_2O/acre
$N_2 = 16$,,	$P_2 = 40$,,	$K_2 = 12$,,
$N_3 = 20$,,	$P_3 = 56$,,	$K_3 = 18$,,

The plantation was watered for five weeks after which irrigation was started. The Burley plants were sturdy and rather uniform for vegetative characteristics. Unfortunately the soil on which the experiment was planted proved to be very heterogenous and some plots were very uneven. Frog eye (*Cercospora nicotianae* Ell. and Ev.) caused considerable damage to the leaves and only the first four primings were cured. Curing conditions were not favourable owing to some spells of wet weather. The analysis of variance showed no significant differences between yield or grade index figures. The mean yield was $439 \pm 23{\cdot}5$ kg. per acre.

(b) White Burley Nitrogen and Manurial Experiment. This was a randomised block experiment with three replications, the plots being 1/180 acre. The treatments were:—

a_1	...	16 kg N , 40 kg P_2O_5 ; 12 kg K_2O per acre
a_2	...	0 ,, ; 40 ,, ; 12 ,,
a_3	...	16 ,, ; (half sulphate of ammonia and half nitrate of soda) ; 40 kg. P_2O_5 ; 12 kg. K_2O (half sulphate and half nitrate of potash) ; 10 tons manure per acre.

The plots with (a_2) soon showed signs of nitrogen deficiency. No difference was observed between the (a_1) and (a_3) plots. The experiment suffered severely from frog eye and no significant results were obtained. The examination of the roots of many plants including 20 selections, revealed only very slight infection by Black Shank or root-knot ; so that it would appear that the White Burley is resistant to the major diseases.

The cured leaf was graded according to local practice with the following results:—

Grade	*Weight (Kg.)*
MV_1	5·0
MV_2	3·8
LMV_1	22·6
LMV_2	18·2
LMVS	15·9
DV_2	2·0
DVS	0·5
SV	29·2
GV	0·4
TOTAL ...	97·6

(2) *1949 Burley Trial.*

(a) White Burley Fertiliser and Spacing Trial. This experiment was designed to test the effect of the three standard fertilisers, each at three levels, in conjunction with three intra-row spacings on the yield and quality of Burley tobacco. The design adopted was the $3\times3\times3\times3$ factorial in blocks of 9 plots with a single replication (Tech. Com. pp. 47–48). Plots were 7/605 acre.

The treatments comprised all combinations of the following:—

Nitrogen levels	n_1 = 12 kg. N per acre	
	n_2 = 16 ,,	
	n_3 = 20 ,,	
Phosphate levels	p_1 = 24 kg. P_2O_5 per acre	
	p_2 = 40 ,,	
	p_3 = 56 ,,	
Potash levels	k_1 = 6 kg. K_2O per acre	
	k_2 = 12 ,,	
	k_3 = 18 ,,	
Spacings	S_1 = 1 foot	
	S_2 = 1½ feet	
	S_3 = 2 feet	

The experiment was planted on the 16th April, 1949. Owing to the dry weather prevailing, irrigation was resorted to early. Growth was poor and the plants completely lacked the vigour of the preceding November plantation. Mildew caused considerable damage during the months of June to August. The Burley proved very resistant to Black Shank disease and nematodes compared to the other varieties planted in the same field.

The analysis of the yield figures shows no significance for the main effects of the fertilisers. The effect of spacing and the interaction between spacing and nitrogen, however, were highly significant. The correlation coefficient between No. of plants per acre and yields is significant at the 5 per cent point being 0·9984.

The following table gives the mean figures for nitrogen and spacing treatments:—

	Yield of green leaf in Hgm/plot ± 14·3			
	N_1	N_2	N_3	*Mean* ± 8·3
S_1	700	774	709	728
S_2	592	580	592	588
S_3	525	512	562	533
Mean ± 8·3	606	622	621	616 ± 4·8

(b) White Bruley progeny Plots. The progeny of selected plants of the 1948 plots were planted in progeny plots in which mass selection was carried out. Some 500 plants were bagged in order to obtain seed for distribution to tobacco growers. Fifty selections (line) were made and after the examination of the roots and of the cured leaf, the seed of only 8 were retained for further tests.

(3) *Air-cured variety trial.* Sixteen selected strains of the preceding year's trial comprising 8 air-cured varieties, 6 Rg. hybrids and 2 Amarello hybrids were planted in this experiment. The design was the lattice with 4 replications and plots 2/605 acre. The experiment was planted on the 7th April, 1949 The Rg. and Amarello hybrids grew more vigorously than the parent varieties.

An attack of mildew which started in June caused such damage as to ruin the whole experiment. The Black Shank cigar wrapper variety Rg. and its hybrids were the most severely affected by the disease, the Amarello being the least affected. Owing to the large amount of leaf lost through mildew, the mean yield of the green leaf harvested was very low being $110 \pm 1{\cdot}9$ Hgm. per plot. The mean number of plants harvested out of 24 planted per plot was $19{\cdot}4 \pm 0{\cdot}25$.

Soil Fumigation

1. *1948 D.D. Mixture Experiment.* The object of this experiment was to test the effect of Shell D.D. on tobacco eelworms in the field. (Shell D.D. is a mixture of unsaturated chlorinated compounds containing dichloropropene-dichloropropane). The following treatments were tried:—

1. 0 M. L.
2. 2 M. L.
3. 4 M. L.
4. 8 M. L.

} of shell DD per square foot of soil surface.

The design was the randomised blocks with 4 replications and plots 1/75 acre. The plots were split, half was planted with the Bonanza and half with the Amarello pointed leaf. Shell D.D. was applied to the soil in holes about 6 inches deep made with a spade, each hole receiving the equivalent of 6 square feet of soil surface. The holes were filled with earth immediately after. Fertilisers were then applied, ridges were built and tobacco planted (on 14th September, 1948).

It was soon evident that the D.D. mixture affected badly the young plants. A large number of plants died, especially in the plots receiving treatments (3) and (4). These pots were replanted one week later, but still a large number of plants died. A third planting, fifteen days after the application of D.D., was more successful.

The plants in all plots then grew normally and no sympton of chlorine excess was observed in the tobacco. When the harvest of leaves had been completed, the plants were uprooted and the roots examined. The results are tabulated hereunder:—

Mean% root infection with nematodes

	0 m.l./ft²	*2 m.l./ft²*	*4 m.l./ft²*	*8 m.l./ft²*	*Mean ±1·03*
Amp.	11·8	8·5	0·9	0·0	5·3
Bo.	33·7	3·9	6·4	0·2	11·1
Mean ±3·10 ...	22·8	6·2	3·7	0·1	8·2

The results indicate that the Bonanza is more susceptible to nematode infection than the Amarello. The root infection of plots receiving D.D. was significantly less than that of the control plots.

Mean% root of dead roots (Black Shank infection)

	0 m.l./ft²	*2 m.l./ft²*	*4 m.l./ft²*	*8 m.l./ft²*	*Mean ±1.83*
Amp.	36·9	55·2	58·1	71·5	55·5
Bo.	52·5	74·3	57·4	77·6	65·5
Mean ±4·53 ...	44·7	64·8	57·8	74·6	60·5

The Bonanza is more susceptible to Black Shank disease than the Amarello and the application of D.D. mixture has increased the root infection significantly.

2. *1949 D.D. Mixture Experiment.* This was a repetition of the preceding trial with the following modificaton: The plots were split in four and two rows of each of the varieties Bonanza, Jamaica Wrapper, Amarello pointed leaf and Amarello broad leaf were planted in each plot. The D.D. mixture was applied on the 19th March, 1949, and the experiment planted fifteen days afterwards. Many of the Bonanza and Jamaica Wrapper plants died later, the cause being Black Shank disease. The results of the experiment are shown hereunder:—

Mean % root infection with Nematodes

	0 m.1./ft²	*2 m.1./ft²*	*4 m.1./ft²*	*8 m.1./ft²*	*Mean±4·0*
Bo	45·7	20·9	15·2	9·0	22·7
Jw	46·5	33·7	33·9	35·3	37·4
Amp ...	55·6	29·3	16·0	20·1	30·3
Amb	57·2	30·0	25·6	29.9	35·7
Mean ±4·3	51·3	28·5	22·7	23·6	31·5

The above figures are considerably larger than those of the corresponding table of the preceding experiment, indicating that nematode infection was very severe in the 1949 trial. Only partial control of nematodes was effected by the application of D.D. mixture to the soil. There were no significant difference of root infection between the treatments 2, 3, 4 or between the varieties.

Mean % root infection by Black Shank.

	0 m. 1./ft²	*2 m. 1./ft²*	*4 m. 1./ft²*	*8 m. 1./ft²*	*Mean±1·2*
Bo	66·7	35·1	34·5	29·1	41·4
JW	50·6	31·6	27·9	50·6	40·2
Amp.	15·5	12·6	18·9	14·5	15·4
Amb	14·6	11·5	6·6	11·4	11·0
Mean ±3·9	36·9	10·2	22·0	21·4	27·0

There were no significant differences between treatments. The Amarellos are more resistant to disease than the Bonanza or Jamaica Wrapper.

Wt. of green leaf harvested Kg./plot

	0m. 1./ft²	*2m. 1./ft²*	*4m. 1./ft²*	*8m. 1./ft²*	*Mean ± 3·03*
Bo	6·8	8·3	8·0	8·0	7·8
JW	6·4	4·7	6·3	4·8	5·6
Amp. ...	22·2	24·8	22·0	20·5	22·3
Amb. ...	28·5	26·4	29·2	26·8	27·8
Mean ± 1·14	16·0	15·9	16·4	15·0	15·8

The yields have not been affected by the D.D. mixture treatments. The yields of the Amarello were significantly higher than those of the Bonanza and Jamaica Wrapper.

No. of standing plants per sub-plot (out of 24)

	0m. 1./ft²	2m. 1./ft²	4m. 1./ft²	8m. 1./ft²	Mean ± 0·58
Bo	14·0	14·7	17·7	15·2	15·4
JW	14·0	13·0	10·7	13·2	12·7
Amp ...	22·5	21·2	21·2	22·7	21·9
Amb ...	23·0	23·0	23·5	24·0	23·4
Mean ± 0·68	18·4	18·0	18·3	18·8	19·0

The stands of the varieties Bo and Jamaica were significantly lower than those of the Amarello. This accounts for the large differences between yields. The treatments have not affected the stand of the varieties.

Grade Index of 1st two primings

	0 m. 1./ft²	2 m. 1./ft²	4 m. 1./ft²	8 m. 1./ft²	Mean ±9·35
Bo	298	279	303	310	298
JW	295	253	295	286	282
Amp.	344	305	298	320	317
Amb.	308	305	319	313	311
Mean : ±11·5 ...	311	297	304	307	302

The above table shows no significant differences in grade of leaf between varieties or treatments.

Rotation Crops

The planting of sugarcane in rotation with tobacco was continued. About 11 acres were planted during the year, so that the area under sugarcane at the end of 1949 was 29 acres. In addition to the various varieties enumerated below; a highly promising variety, M.423/41, was planted at the station.

The weight of canes harvested during the year was 309 tons, the average yield being about 20 tons per acre. The supply of irrigation water was insufficient during the greater part of the growing period. The yields of the varieties M.112/34, M.165/38, M.76/39 and M.63/39 were higher than that of M.134/32. The 3 ft. spacing yielded more canes than the 4½ ft., and the latter more than the 6 ft. spacing. The 3 ft. spacing was the more effective in suppressing weed growth.

Groundnuts were planted in the interrows of all new cane plantations. The local variety "Cabri", planted in 1949, grew well with the rains of February and March, checked the growth of all weeds in the cane interrows and yielded fairly well. The same variety did not grow as well when planted in the dry months of August to October.

Small quantities of seed of eight varieties of sorghum were planted at the station on behalf of the Sugarcane Research Station in June and July 1948. Growth was very poor owing to the cool season, but sufficient seed was obtained for planting small plots in February 1949. The last plantation was better than the first one and some varieties did fairly well. About 10 cars of each variety were bagged and seed has now been obtained for planting a small trial.

Weed Control

At the request of the Acting Deputy Director, experiments for the chemical control of "chiendent" (*Cynodon dactylon*, Pers.), were started at the station by the Assistant Botanist of the Sugarcane Research Station at the beginning of the year. The weed killers tested included sodium chlorate and ammonium

sulphamate. 10 per cent and 15 per cent solutions of these substances were applied to small plots at the rate of 100 gallons per acre. Sodium chlorate gave very good results. In the plot treated with the 15 per cent solution, the "chiendent" was almost completely killed. The plot was afterwards dug to a depth of about 15 inches including 3 inches in the subsoil into which the soboles of the "chiendent" had penetrated and it was found that most of them were in a state of decay. Some Burley tobacco planted on this plot grew normally. When the tobacco plants were uprooted, it was observed that the roots were free from nematodes.

"Chiendent" growing on both sides of a stone irrigation canal was not severely affected by a 15 per cent solution of sodium chlorate applied in the dry month of October. Sodium chlorate should therefore be applied in February or March, when the growth of the "chiendent" is luxuriant.

Further experiments will be conducted with sodium chlorate. A local firm has kindly offered to supply the chemical free, and they will be informed of the results of the experiments.

Staff

Again the post of Government Tobacco Officer remained vacant throughout the year. The writer was Acting Government Tobacco Officer in addition to his normal duties of Agricultural Officer. The Clerk, Mr. C. Moti, resigned on the 30th November, 1949, and was replaced by Mr. R. Julleckeea on the 16th December, 1949.

Educational

One apprentice completed his training at the station and another was dismissed for misconduct. A third apprentice resigned on ground of ill-health. The three other apprentices are now undergoing their third year training.

Only a few tobacco growers visited the station during the year.

Buildings

Repairs were effected to the barn flues and concrete floors were laid in the four principal barns. The construction of two new Gundry furnaces was started at the end of the year to replace the two old underdraught furnaces.

Bulls

Three young bulls of the Government Dairy were kept at the station for manure purposes. One of the bulls was removed in July.

General

The Assistant Under Secretary of State for the Colonies visited the station on the 20th April. Mr. R. H. Fraser, Senior Agricultural Officer, Northern Rhodesia, also visited the station in April in the course of his investigation on the tobacco production of the island. In his very able report, he has drawn a new research programme for the station. His recommendations have been adopted by the Tobacco Board and the programme of the station has been modified accordingly.

E. LESUR,
Acting Government Tobacco Officer.

Entomological Division

I. Pests of Sugarcane

The Sugarcane White Grub, Clemora smithi (Arrow). The considerable amount of work directed against this pest during the year is conveniently divided into three groups.

(a) Biological Control

As a result of the work in North Africa by the Associate Entomologist, Mr. A. L. Moutia, the Tachinid *Dexiomorpha picta* Meig. and the Scoliid *Tiphia morio* F. were introduced. Unusual weather conditions which prevailed in Africa considerably handicapped this work, a prolonged drought made the mass collection of the host grubs very difficult, and large numbers could only be obtained after the first rains in late November 1948. The fact that a total of 396,500 grubs were collected and examined for these parasites in the four subsequent months reflects the energy devoted to the work. Of this total, most of which were grubs of *Rhizotrogus carduorum* Er., 4,150 were parasitised by *D. picta* and 2,564 by *T. moria*. These were dispatched to Mauritius by air in eleven consignments.

Of the grubs parasitised by Dexiomorpha, 2,345 were received alive. They were transferred on arrival from the shipping cases to small round tins 3″ × 2¾″ diameter containing compost-soil, one grub being placed in each tin. Eventually, 870 parasite puparia were obtained from the grubs, and from these 550 adults emerged, there being the high pupal mortality which is so often a feature of laboratory reared Tachinids. After retention for a few days for mating to occur, 203 females and 247 males were released, the remainder were used for breeding experiments on *Clemora*. The liberations were made in two localities during February and March, one of the localities being in the uplands and the other in the northern coastal plain.

The breeding which was attempted with the remaining flies was intended to increase the number for release. Mating was readily obtained in 24″ square muslin cages, and after a few days in these cages, during which time food was supplied as granulated sugar and water, the females were removed and isolated in 6″ × 1¼″ glass cylinders. Between 10 and 15 days after mating larviposition began, the planidia being seen on the walls of the cylinders. The females were then dissected in 5 per cent saline solution, between 60–80 active planidia usually being obtained per female. Two or three were placed on last instar *Clemora* grubs, and these placed in tins of compost-soil. From 1,809, Clemora so 'inoculated,' only 13 adult *Dexiomorpha* were obtained and so breeding was abruptly terminated. Most of the positively inoculated grubs died before the parasites could finish their development. The cause remains unknown; others succumber to mite attack. With the few parasites that developed, the larval stage lasted 15–20 days, and the pupal stage 13–16 days, making the total developmental period from fertilization of the egg to adult about 38–50 days. The temperature and humidity ranges during these experiments were Mean Min. 24° C, Mean Max. 31° C, and similarly 68 per cent R.H. and 91 per cent R.H.

The 2,564 grubs parasitised by *Tiphia morio* were treated on arrival in the same manner as were those parasitised by Dexiomorpha, but not a single adult parasite was bred from them. This is attributed chiefly to the adverse effect of the shocks in transit and to the conditions within the shipping boxes upon the delicate ectoparasitic larvae. The collection and dispatch of larval *Tiphia* was, however, an alternative to the dispatch of adults, and was undertaken owing to the fear that the mission might terminate before adults became numerous. But in January–February, one month before the end of the mission, it became possible to collect appreciable numbers, and of a total of 2,144 dispatched, 1,097 were received alive in Mauritius. These were immediately released in six different localities.

In addition to the above two parasites, the Tachinid *Dexia rustica* F., a parasite of the European white grub *Melolontha melolontha* L., was introduced. As mentioned in the Annual Report 1948, the first air consignment was received on 1st December, 1948. A second was received on 10th June, 1949. They were despatched by the Forestry Commission, Farnham, England, on behalf of the Commonwealth Bureau of Biological Control. The parasitised *Melolontha* grubs were treated as were those described above for *Dexiomorpha*, and the results of both consignments are summarised as follows:—

	1st consignment	*2nd consignment*
No. parasitised grubs sent ...	1,875	2,125
No. same received alive ...	1,669	1,677
No. Dexia puparia obtained ...	394	277
No. Dexia adults obtained ...	190	200
No. Dexia adults released ...	130	164

The total number of *Dexia* adults released is thus 294 of which 160 were females and 134 males. Those obtained from the first consignment were released in July and August. The number of adult *Dexia* which resulted from these consignments cannot be considered satisfactory. A very large number of host grubs did not yield parasites and about 800 successfully pupated although the parasites' respiratory funnels had been visible in them. There is little information on the suitability of *Dexia* to its new host and climate. It was exceedingly difficult to obtain mating in the laboratory and very few ' inoculations ' could be made on *Clemora* grubs, but from these, two adult *Dexia* were obtained showing that development can occur within this host.

In February, during the adult season of *Clemora*, 200 toads *(Bufo regularis)* were collected and their stomach contents examined. Seven of the toads had one beetle in their stomach, and one had two. It has long been realised that this toad, which was introduced from South Africa by a private individual about 1927 and which is now extremely numerous, is a poor predator of *Clemora*. This experiment illustrates its valuelessness in this respect.

The campaign for the planting of *Eupatorium pallescens* along the borders of cane fields as a food-plant for Scoliid parasites was continued by the Acting Assistant Entomologist. Seed beds were laid out at Barkly and Pamplemousses Experimental Stations by the Agricultural Division ; this enabled the distribution of about 5,000 seedlings to estates. It is intended to continue this distribution, but it is emphasised that estates should themselves make efforts to propagate this plant, the importance of which has increased in many areas owing to he reduction of *Cordia* flowers (*see* Section 2).

(b) Insecticidal Control

Continuing experiments described in the Annual Report for 1948, Benzene hexachloride, in the form of a dust containing 2·6 per cent gamma isomer, was applied broad cast to experimental plots in November 1948, i.e., at the beginning of the adult season. The latin square layout was adopted, the size of the plots being 50 feet × 6 rows, and the treatment dosages 75, 50, 25 and 0 kilograms per arpent. Four squares were laid down, all in virgin cane about one foot high. The squares were visited during the ensuing larval season, in May 1949. No appreciable infestation had developed in the areas containing the squares, but a start was made to assess results by diggings and larval counts. The height of the cane, however, was such a handicap that labourers became confused amongst the plots and could not be properly supervised, no confidence could be placed upon the figures so obtained, and this experiment was reluctantly abandoned.

The work reported in the Annual Report 1948 showed that dust applied to the soil surface of already infested stools does not kill the grubs. Other experiments which were described were designed to utilise the residual properties of B.H.C., which was mixed with the soil during planting operations several months before the occurrence of the injurious larval stages. No significant results were obtained, but since only light infestations occurred in the fields containing the experimental plots, the results are not regarded as conclusive. Accordingly further trials were made during the year on a different basis. In three fields in *Clemora* infested localities, a block of $\frac{1}{2}$ arpent (1 arpent = 1·043 acres) was uniformly treated with the same dust; in two of the blocks, it was applied at the rate of 75 kilograms per arpent, and in the other at 50 kilograms per arpent. Application was made in the open furrows at planting time in August and September. It is intended, in each instance to assess results by comparing the yield of cane from the blocks with that of the rest of the field over a period of years. The blocks were visited in November and in one an impression was gained that tillering was reduced. Counts made along sixteen forty-foot lengths of row, inside and outside the block, verified this observation; the difference between the mean number of tillers per 40-foot length of row inside and outsIde the block was 16·4, which is fully significant at the 5 per cent point.

In addition to the above, in two blocks of $\frac{1}{2}$ and $\frac{1}{4}$ arpent respectively containing virgin cane, the dust was applied in a band along the rows. In the first block it was applied at the rate of 50 kilograms per arpent, and in the second at 100 kilograms per arpent. Application was made in June when the cane was about 2 feet high. Results will be assessed by yield of cane, over a period of years, as above.

(c) Estimation of soil populations

The work which has so far been carried out on this subject has progressed favourably. Since it is of such a nature that it cannot be published in part, merely an outline of its aim is given. A rough method of estimating the larval population of infested fields has been in use for many years. This method, although it has been of some use, is not satisfactory owing chiefly to the sampling method. A new method is being devised with approved sampling

technique which will enable the error variance of the estimates to be defined. With a method which is mathematically sound, it is hoped to extend the work to the relationship between degree of infestation and yield of cane.

The Sugarcane Moth Borers. A research program on the three moth borers,*Proceras sacchariphagus* Boj., *Sesamia vuteria* Stoll., and *Olethreutes schistaceana* Snell., was commenced. The work will cover their taxonomy, life histories, parasites, and economic importance, and is intended to be a foundation for future control work. The incidence of the various parasites and their value as controlling agents is being given special attention, and in this direction, a few discoveries, worthy of note, may be mentioned at this juncture.

A *Tetrastichus* sp. was recorded for the first time from pupae of *Sesamia*. In the laboratory, it also parasitised pupae of other moths including those of *Proceras*. The insect is very prolific and superparasitism is very heavy, as many as 500 individuals emerging from one host pupa. A small breeding was carried out and about 9,000 were released in a few fields heavily infested with *Proceras*.

From pupae of *Olethreutes rhynchias* Meyr., a stem borer of *Cajanus cajan,* the Eulophid *Trichospilus pupivora* Ferr. was obtained. This parasite was introduced from Ceylon in 1939 to further the control of the above cane borers. This is its first recovery.

The hyperparasite *Calliceras* sp. probably *fijiensis* Ferr. was recorded from *Apanteles flavipes* Cam., a primary parasite of *P. sacchariphagus*.

The Ceylonese *Bracon albolineatus* Cam., which was first recovered last year, does not appear to be numerous. It was only once collected during the year from *Sesamia* infesting Rice plants.

Through the agency of the Commonwealth Bureau of Biological Control, the wet area form of the Amazon Fly, *Metagonistylum minense* Towns., was imported from Trinidad for the control of *P. sacchariphagus*. Twenty six air consignments constituting 1918 puparia were sent, but from these only 408 adults emerged, many of which had malformed wings. A total of 230 flies in good condition we released in two centres after mating had occurred.

On 300 fully grown *Proceras* caterpillars, 3 or 4 parasite planida were placed, but only 3 per cent of these inocuations were successful. The technique was similar to that used for the breeding in Trinidad, so it appears that as with *Lixophaga* (see Annual Report 1948), it is unlikely that *Proceras* is a suitable host, the generic distinction between this species and*Diatraea saccharalis* F. the West Indian host, being too great for the host " tolerance " of these Tachinids.

Five small experimental consignments of *Microdus (Bassus) stigmaterus* Cress. (Braconidae) were also received from Trinidad in July–August. They totalled 90 pupae, from which 15 females and 7 males emerged. These were released in the field.

Minor Pests. Very localised attacks of the following minor sugarcane pests were encountered—*Aulacaspis tegalensis* (Zehnt.) (Diaspididae), *Neomaskellia bergii* (Sign.) (Aleyrodidae), and a Thysanopteran, probably *Fulmekiola serrata* (Kobus).

II. Control of the Black Sage, Cordia macrostachya (Jacq.)

The work devoted to the biological control of this weed has produced remarkable results during the year as a consequence of the introduction of *Schematiza cordiae* Barb. (Galerucidae), the second phytophagous insect to be introduced from Trinidad. The first species introduced, *Physonota allutacea* Boh. (Cassididae) is now considered as a failure ; it has been recovered in only one restricted locality where it does no appreciable injury to Cordia (see Annual Report 1948, and for a complete account of its introduction and failure see Williams, J. R., 1950, Bull. ent. Res., *40*, pp. 479–480).

The total number of *Schematiza cordiae* bred in the laboratory and released is approximately 18,000. They were released between March 1948, and February 1949, in various localities. Breeding was discontinued when very large numbers appeared in the field, and thenceforth adults were collected from localities where they were abundant for further dissemination. About 60,000 were so collected and released between February and April after which further work of this nature was considered unnecessary.

It is now evident that the activity of *Schematiza* is greatly reduced from about June to December, varying somewhat with the climatic regions. In the more equable climate of the uplands, this dormancy is less pronounced and activity recommences a few weeks earlier than in the low-lying districts. Owing to this less pronounced dormancy in the uplands, it was originally thought that these areas were more suitable for *Schematiza,* but in fact, it is in the lower districts that most severe injury has been sustained by *Cordia.* The multiplication of *Schematiza* in many of these latter areas during January–March was phenomenal, very many acres of scrub being completely stripped of both leaves and inflorescences, while foliar damage of varying intensity was more widespread. Bushes which were denuded during the summer months have remained without inflorescences throughout the year, a most significant point when it is borne in mind that the agressiveness of *Cordia* is due to its fecundity, it having been estimated that one acre of scrub normally produces approximately 134 million fruits annually (Wiehe, P.O., 1946, Pub. No. 28, Colony of Mauritius, p. 24). The most vigorous growth of *Cordia* is during the summer months and severe defoliation at this period has a most adverse effect on the plant, especially in dry areas where most of the leaves are normally shed in winter. Sustained defoliation will probably kill bushes completely, for already the branches of severely attacked plants are dying progressively from the tips.

Schematiza is incapable of completing its life cycle in the field on any plant other than *C. macrostachya*, although the adults will feed and oviposit upon two other members of the genus, namely *C. myxa* and *C. abyssinica*. These are of no economic importance and injury is not severe, their tough leaves seem to be unpalatable. The specificity of *Schematiza* is strikingly displayed where severe defoliation of scrub has occurred ; among the bare shoots other weeds are seen untouched and flourishing as a result of the injury of their dominating partner.

At intervals throughout the year, collections of eggs and larvae were made, but no parasites emerged therefrom. No additional predators have been observed, so that the previously recorded *Afrius* sp. (Pentatomidae) appears to be the only adverse faunistic element, and one which does not apparently exert any significant reduction of *Schematiza*, although it is frequently seen aggregated on attacked bushes.

The release of a third phytophagous species dispatched from Trinidad by the Commonwealth Bureau of Biological Control was commenced in October. It is *Eurytoma* sp., a Chalcidoid which develops within *Cordia* seeds. To date, approximately 775,000 seeds collected in Trinidad by Dr. Simmonds have been received. From these, emerge a number of Chalcidoids, the identification and biology of which have not been determined, but some at least are parasitic upon the phytophagous *Eurytoma*.

The procedure which has been adopted is to examine daily the emergents from the seeds, select the *Eurytoma* and immediately kill the remainder. The *Eurytoma* are then placed in glass containers with a supply of honey and water and left for two or three days during which time mating occurs. They are then released on *Cordia* bushes. No food-plant specificity tests have been carried out with this insect owing to its specialised mode of life. The number so far released is small, amounting to about 300 females and 200 males over the two months since liberation was started. All have been releaed in the vicinity of the Department of Agriculture to facilitate observations. It is considered too early to determine if establishment in this area has yet occurred, but it has been found by means of cage experiments in the open that *Eurytoma* will reproduce on *Cordia* in Mauritius. Sufficient numbers for release seem therefore the only proviso for its establishment.

III. Pests of Cajanus cajan L. (Pigeon Pea, Ambrevade)

The Pigeon Pea is a short lived perennial which is admirably suited to Mauritian soil and climatic conditions. Although a valuable food and green manure crop, its cultivation is extremely restricted owing to regular and intense insect attack. Research has recently been commenced to find a method of control which will permit its cultivation on a larger scale. The work has so far centred upon the identification and importance of the various pests and their parasites. The number of species already tabulated is large, it includes six which destroy the flowers and pods, ten which feed upon the leaves and young shoots, and one stem borer. Several more remain to be enumerated, but the major pests in the Réduit area, to which work has so far been limited, are *Maruca testulalis* Gey. (Pyraustidae), which destroys flowers and bores pods, *Etiella zinckenella* Tr. (Phycitidae) and *Pardasena virgulana* Mabille (Noctuidae), which are pod borers, *Olethreutes rhynchias Meyr.* (Olethreutidae), a stem borer, and *Cosmolyce boeticus* L. (Lycaenidae), another flower and pod borer. The others, which in their own right are minor or comparatively minor pests, collectively do much harm, but it is evident that control work must be directed against the flower and pod feeders. A number of parasites have been bred from these pests for the first time and are awaiting identification.

A preliminary experiment with 4 per cent wettable D.D.T., in which one row of bushes was sprayed and a nearby row left as a control, gave good results. Many more pods were produced on the sprayed bushes owing to reduction of flower attack, and the percentage of bored pods was low. More detailed experiments of this nature are to be carried out in the near future.

IV. Pests of Tobacco

In April, an experiment with D.D.T. smoke was carried out in the Tobacco Warehouse against *Lasioderma serricorne* F. to determine if this method possessed any advantage over Pyrethrum fog which has regularly been used, with considerable satisfaction, for a number of years. A block of adjoining stores with a total volume of 195,000 cubic feet was selected for the trial. The doors and windows were closed but not sealed, and before igniting the smoke canisters, filter papers of standard size were laid flat upon floors, ceilings and tobacco bales. These were subsequently removed and the deposits estimated. A great deal of smoke was lost through eaves and badly fitting shutters and the deposit as estimated from the filter papers was very low, varying from 5·2 mgrs/sq. ft. to 46·4 mgrs./sq. ft., with an average deposit of 20·1 mgrs/sq. ft. In the laboratory, about 100 beetles were confined for 45 minutes to filter papers impregnated with D.D.T. solution at doses up to 50 mgrs./sq. ft. There was no difference between controls and treatments. The work was then discontinued ; thorough sealing of stores would be necessary with this treatment in order to obtain a better depoit, while the cost of treatment is high ; furthermore there exists a definite fire hazard. In these respects, D.D.T. smoke compares unfavourably with the machine generated Pyrethrum fog which is labour saving, inexpensive and safe.

As reported by the Plant Pathological Division, the virus disease, Tobacco Leaf Curl, has been detected in recent years. The vectors in other countries are known to be Aleyrodids of the genus *Bemisia*. White flies collected near diseased tobacco plants during the year were identified by Dr. R. Takahashi, Tokyo, as *Bemisia tabaci* Lindl. (=*B. gossypiperda* M. and L.) which is a vector of this disease in India. It is hoped to do more work upon this subject.

V. Miscellaneous

(a) Tomato plantations, particularly those in the dry northern area, were affected by severe outbreaks of Red Spider, *Tetranychus* sp. Sulphur and soap sprays were recommended. In many attacked fields the endemic Coccinellid *Stethorus vinsoni* Kapur was extremely numerous, and in a few instances localised attacks seem to have been suppressed by this insect.

S. vinsoni was first recorded in 1934 and has not previously been found in any considerable numbers. It is likely that the widespread outbreaks of Red Spider this and also last year have contributed to its increase, but whatever the cause, it has become a predator of considerable value. On the other hand, the Staphylinid *Oligota pallidicornis* Cam., which was formerly a common predator of Red Spider, has but rarely been seen.

The fruit boring Noctuid, *Heliothis armigera* Hb., also caused losses on some plantations.

(b) In February, a consignment of *Dirhinus giffardii* Silv. (Chalcididae), a parasite of *Dacus* spp. (Trypetidae) was received from South Africa. From this, 140 individuals were released in two localities.

(c) Progress has been made with a survey of insects which attack timber. Unfortunately, the transfer to another Department of the officer in direct charge of this work has caused it to be terminated for some time.

Phoracantha semipunctata F., a pest of sickly and newly felled Eucalyptus trees, came into prominence owing to the desire to leave girdled trees standing for several months to determine if better seasoning resulted by this method. Such girdled trees, except those in very high rainfall areas, were invariably attacked to such an extent that the wood was readered completely unfit for use. Experiments are in progress to determine if spraying trees immediately after girdling is a practicable method of control.

VI. General

(a) Lectures in Zoology and in Entomology were delivered to students of the College of Agriculture by Mr. Mamet and the Entomologist respectively.

(b) Many requests for advice and assistance were received throughout the year. Sprayers were constantly loaned to small planters, but it is suggested that the planters cooperative societies obtain sprayers for the use of their members, as the stock of this Division is insufficient to meet any heavy demand.

(c) Publications during the year are:—

Mamet, R. (1949). An annotated catalogue of the Coccoidea of Mauritius. Maur. Inst. Bull. *3*, Pt. 1, pp. 1–81.

Williams, J. R. (1949). A discussion on the present status of the Sugar-cane pest *Clemora (Phytalus) smithi* in Mauritius. Rev. Agric. Maur., *28*, pp. 292–295.

(d) Acknowledgment. In conclusion, I wish to record my appreciation of the assistance received from all members of the staff during the year.

J. R. Williams,
Entomologist.

Division of Plant Pathology

1. Staff Changes

Early in January, Mr. P. O. Wiehé, former Head of the Division, proceeded to his new post of Plant Pathologist to the Department of Agriculture in Nyasaland, and the Assistant Plant Pathologist was appointed Head of the Division.

In August, Mr. L. Orieux, Plant Inspector at the Customs and Airport, proceeded on a 3-year leave to study Biology in England, when Mr. J. Duhamel, the Scientific Assistant, was made acting Plant Inspector. The post of Scientific Assistant has not yet been filled up, through lack of a suitable candidate.

In October, Mr. S. Félix, Technical Assistant in the Entomological Division, was appointed Acting Assistant Plant Pathologist.

The Head of the Division, having thus been without Assistant from January to October, and without Scientific Assistant from August to the present, has experienced difficulties in the carrying out of the ordinary work of the Division. Research, in consequence, was handicapped and will continue to be so until adequate staffing is possible.

2. Diseases of the Sugarcane

Owing apparently to the absence of cyclone and to the generally good growth conditions which prevailed during the year, no major disease of the sugarcane came into prominence in 1949.

Localised outbreaks of red rot on M.134/32, consequent chiefly upon borer attacks, caused a certain amount of damage on some estates. The disease was also in part responsible for the failure of setts to germinate at certain places.

Gumming, leaf scald, and smut, in consequence of high resistance by the varieties now grown, appear to be becoming things of the past. No new occurrence of gumming disease on palms was detected.

Through the regular use of Aretan at planting time, chiefly by the big planters, pineapple disease is fast dwindling into insignificance. In this connection, the newly appointed Field Demonstrators at the Sugarcane Research Station, are making active propaganda for the use of the fungicide by small planters, and so easy is its application and so efficient the treatment, that it is expected its use will soon become general in Mauritius.

Streak disease which, owing to the absence of insect vector, never spread in the island, has disappeared with discontinuance from cultivation of the R.P. 8 cane, the only variety on which it was detected.

The above inspiriting view of the question is unfortunately depressed by the experience of Chlorotic Streak, a disease of virus origin on cane. In certain regions of the Island where the incidence of the disease is high, field yield was reported to be lower than anticipated, and in a certain number of cases, poor stand in newly planted fields was found related to high incidence of the disease. Unfortunately, the new varieties produced by the Sugarcane Research Station have shown susceptibility towards the disease.

Chlorotic streak is more prevalent in regions of high rainfall and where the drainage is bad ; in such places, therefore the presence of the disease may result in losses of some economic importance. It was suggested to one Estate this year to start a nursery using cuttings treated with warm water at 52°C for 20 minutes, which has been proved to eliminate the disease from infected material. This procedure, coupled with roguing of diseased stools in the nurseries, may perhaps yield good results on Estates where the incidence of the disease may prove to be high.

No investigation has yet been made as to the presence of insect vectors of the disease here, but the fact that new seedlings pick up infection in the fields during propagation points to the existence of such insects in the Island.

3. Diseases of Tobacco

(a) Leaf Curl. As in 1948, very few were the cases of leaf curl recorded on tobacco this year, all of them having been detected in Pamplemousses district.

Graft experiments made this year proved that infection did pass on from the diseased to the healthy parts of the plants, thus proving the infectious nature of the trouble and confirming the diagnosis arrived at in 1948, that it was the leaf curl disease.

Characteristic enations were detected common on a Sida-like weed (family Malvaceae) in the fields where leaf cure affected tobacco plants were detected, or in their immediate neighbourhood. The same weed was also detected diseased in the towns of Rose Hill and Beau Bassin, in Plaines Wilhems district. The typical enations were also observed on one other yet unidentified Malvaceous weed and on a *Capsicum* plant at Trou aux Biches.

The insect side of the question is being investigated by the Entomological Division.

(b) A new type of enation disease. What at first seemed to be a new virus disease was observed in June on a number of plants at the Richelieu Tobacco Experiment Station. The condition manifests itself by a reduction in size of the leaf coupled with the presence on the underside of the midrib of ridges of small, dark-green, rather warty enations, continuously or frequently interrupted along their course. The margins of the affected leaves are characteristically rolled upwards. There is no mottling, but a variable amount of thickening of the finer veinlets is present, causing increased thickening of the blade. By reflected light from the under surface, a peculiar, fine, crapy appearance is observed.

The disease could not be transmitted by grafting, hence it is not apparently of virus nature. Experiments are to be effected about the seed transmissibility of the trouble.

4. Filao Wilt

Work was continued on the disease of filao (*Casuarina equisetifolia* L.) reported last year as probably caused by *Xanthomonas solanacearum* (Smith) Dowson.

Inoculations into young filao and tomato plants with various isolates from the gum ooze produced on sectioning diseased plants were successful ; the causative bacterium was reisolated from the inoculated filao plants, and produced typical wilt when reinoculated into tomato plants, thus proving definitely that *X. solanacearum* is the factor, or one of the factors, causing the death of filao trees in the Island.

Inoculations with smut spores *(Trichosporium vesiculosum)* have remained negative up to the present, which would tend to show that that fungus is but a secondary cause of the death of the filao trees.

5. Banana disease

Observations made this year have indicated that the disease on the dwarf banana (*Musa cavendishii* Lamb.) mentioned in last year's report could possibly be due to nematodes. The symptoms agree with those of the "eelworm black rot" disease and eelworms have been observed in sections of diseased rootstock tissue, though not consistently enough to warrant a definite conclusion. The studies will be continued.

6. Coconut Wilt

Outbreaks of wilt on the coconut palm were observed this year in the plantations on the 'Pas Géométriques' at Grand Gaube, Trou aux Biches, Baie du Tombeau, Pointe aux Sables and Pointe d'Esny. At all these places, a minute, dark-red mite was detected in large numbers on the underside of the leaves of the diseased trees.

In one instance at Pointe d'Esny, a different type of wilt was observed associated with a Fulgorid insect, but recovery occurred after some time.

Observations on the trouble are being continued by both Biological Divisions.

7. Wilt of Eucalyptus

At the request of the Entomological Division, plantations of *Eucalyptus tereticornis* (Sm.) were inspected at La Ferme in Black River and at Baie du Tombeau in Pamplemousses district, in which trees were dying in great numbers. All the diseased trees were badly tunnelled in by the larvae of the beetle *Phoracantha semipunctata* F., chiefly towards their base, with the result that affected trees finally fall over even in light wind. The insect was, however, considered by the Entomological Division as probably secondary to other causes, as disease or drought.

Investigations were therefore started and a black fungus was obtained in culture; it has just recently been inoculated into healthy *E. tereticornis* plants.

8. Diseases of loquat (Eriobotrya japonica L. ndl.)

(a) A leaf spot on trees at Curepipe was reported causing severe defoliation. The spots are concentrically ringed and bear on their under surface minute cylindrical mycelial masses at first white, becoming dark-coloured later. The gemmae-like bodies are borne on dark pedicels, from which they are abstricted when they fall off. The fungus is apparently of the nature of the gemmiferous fungus described by G. B. Wallace from Tanganyika (East. Afric. Agric. Jour., XIV, 3, 141–143, 1949).

(b) Die-back on a tree at Quatre Bornes. An unidentified fungus was isolated from tissues of the affected tree which proved to be the causative agent by rapidly killing young inoculated potted plants.

(c) Root and collar rot associated with a fungus similar to *Armillaria mellea* in appearance on trees at Vacoas. Neither fructifications nor rhizomorphs were however observed.

9. Legislation on Plant Diseases

Proclamation No. 1 of 1949. To control the importation of plants and plant parts and certain other articles.

(Revokes Proclamations No. 10 of 1926, No. 26 of 1941 and No. 37 of 1945).

Proclamation No. 3 of 1949. To proclaim areas planted with tobacco in the Island to be places infected or suspected of being infected with leaf curl disease of tobacco.

Proclamation No. 12 of 1949. To prescribe the conditions under which the importation of Mushroom spawn shall be permitted into Mauritius.

10. Other miscellaneous diseases

On *Dombeya* sp. Root and collar rot associated with a fungus resembling *A. mellea*, at Vacoas. No fructification or rhizomorphs observed, however.

On *Tecoma* sp. Wilt on Forest Department land at Powder Mills, Pamplemousses, suspected caused by *Xanthomonas solanacearum* (Smith) Dowson. An abundant dirty to dark-coloured gum oozes from the cut vessels of the wood. A bacterium isolated from the ooze and inoculated into tomato plants resulted in collapse and browning of the tissues around the inoculated centres. The bundles of the tomato plants were stained brown down into the roots, but neither wilt nor gum ooze was observed. Inoculations into young tecoma plants resulted in a certain number of plants dying, but work in other directions prevented further study of the subject.

On *Alstonia neriifolia* D. Don. Investigations also at request of the Forest Department. A die-back present on young trees in a plantation at Belle Rive Forest, Curepipe. A *Glocosporium*-like fungus was obtained in culture, but shortage of staff prevented further study of the disease.

On *Cordia macrostachya* (Jacq.) Roem and Schult. Black mould of inflorescence and fruit caused by a species of *Macrosporium*. Feeding lesions of the larvae of the beetle *Schematiza cordiae* Barb. were present on both the stalks and the fruits of the Cordia inflorescences, from which traces of a slightly sticky exudate were present. The fungus was most likely growing on the exudate.

On Mango fruit. Ripe mango is very occasionally observed with thick, brownish-purple to black vessels inside the fruit, most abundant just beneath the skin and on the outside of the endocarp. No external sign of the affection is observable, which in no way affects the eating qualities of the fruit.

From one such fruit, a bacterium was obtained, which, inoculated into still green fruits, produced blackened vessels internally. Reisolates were obtained, but their pathogenicity could not be tested as the fruit season was over at the time.

11. Control of Imported Plant Material

(a) Destruction of imported varieties of sugarcane. In December 1947, 3 cane varieties had been received from Canal Point, Florida, followed in January 1948 by 2 others from Queensland. The latter batch included the Q.28 cane, and during the 2 generations that the canes were kept under quarantine, some premature wilting was exhibited by the leaves of that variety. In the absence, however, of symptoms of any known major cane disease, the canes were released for planting in the fields at the Central Experiment Station. Recommendations, however, were made that the Q.28 should be closely watched as to its behaviour in the open.

Soon after their release, it was found out from the 48th (1948) Annual Report of the Bureau of Sugar Experiment Station, Brisbane, that an obscure disease had been detected in Queensland on the Q.28. Information was immediately asked for and the reply came a month later to the effect that no external symptom had been observed to indicate the presence of the disease, that it had been proved to be transmissible by the cutting knife and that it results in premature wilting and stunted growth, chiefly under dry conditions, when in ratoons no millable cane was at times produced. Inasmuch as all the canes had been growing in one and the same greenhouse, the introductions from Canal Point as well as those from Australia were immediately destroyed. The effort made during nearly 2 years of Cane Quarantine work, which involves weekly inspections by the Entomologist, the Geneticist of the Sugarcane Research Station and the Plant Pathologist, was therefore totally lost.

(b) Erection of a new Cane Quarantine Greenhouse. Long before the occurrence of the above-mentioned incident, however, it had been recognized that the greenhouse which had been erected at the Central Experiment Station in 1931, was wholly unsatisfactory and did not ensure adequate protection. As a result of the visit to the West Indies and America of the former Plant Pathologist, Mr. Wiehe, in 1945, recommendations were made for building a quarantine greenhouse suitable for Mauritius conditions, in consequence of which one was finally ordered from Messrs. Lord and Burnham, of Irvington, New York, and was erected at the Central Experiment Station during the year. It had been intended that an all-metal greenhouse should be provided, to avoid the constant attention needed by wooden constructions in the tropics ; unfortunately, none was available, and a semi-iron one was forwarded.

The new house consists of four separate compartments about $12 \times 10\frac{1}{2} \times 12$ ft., each opening into a passage $6\frac{1}{2}$ ft. wide, leading into an inspection room at one end and, at the other, into a shed fitted with an incinerator and in which a suitable steam sterlizing outfit is to be provided.

The side and top sashes protecting the bronze gauze panels are operated mechanically from the inside, and an oil trough runs around the basement of the whole construction. Each room has a tap for watering and will hold metal half-drums in which the canes will be grown. Consignments from different countries will be grown in different compartments. The following cane varieties received from South Africa in November are now growing in the greenhouse: Co.419, Co.421 and C.P.34/120.

(c) Inspections at the Customs and Airport. The inspection of imported plants and plant products continued as usual under the supervision of the Division. Insects collected by the Plant Inspector in the incoming planes were regularly forwarded to the Entomologist for identification.

12. Miscellaneous

The Plant Pathologist delivered the usual lectures in Botany and Plant Pathology to 2nd and 3rd year students of the College of Agriculture during the year. The Assistant Botanist of the Sugarcane Research Station, Mr. E. Rochecouste, delivered the lectures in Botany to the 1st year students from January to October, when Mr. S. Félix, then appointed Acting Assistant Plant Pathologist, continued the work.

Visits were paid to planters whenever necessary, when advice was given as to the control of plant diseases.

G. ORIAN,
Plant Pathologist.

Chemical Division

Staff

The activities of the Division was greatly reduced during the year owing to the following changes in the staff.

The Chemist acted as Deputy Director from February to December.

The Scientific Assistant was seconded on duty as Acting Government Chemist, Medical Department, from January to May.

The Asistant Chemist acted as Chemist from February to December.

Aloe Fibre

An automatic Humbert decorticator is being erected at the Central Experiment Station in order to study *(a)* the actual efficiency of the machine ; *(b)* different feeding devices and *(c)* to find the cause producing the twisting of the dried fibres.

Tobacco

The selection experiment was continued at Réduit Experiment Station. The leaves of all the healthy Amarello plants were examined for their sugar content ; about 31 plants were analysed. Figures vary from 11.76 to 17.81 and are quite satisfactory.

The average sugar content of the Amarello variety not selected is about 5 per cent.

The seeds from the plant having shown the highest sugar content (17·81) were selected for the next progeny plots.

Fodder

The chemical composition of two local fodders was determined at the request of the Animal Husbandry Officer. The results are recorded below:—

	Moisture	*Ash*	*Fibre*	*Fat*	*Protein*	*Carbohydrate*
Gazon Anglais (*Axonopus affinis*) ...	73·00	1·40	7·97	0·25	1·95	15·40
Herbe Condé (*Cordia macrostachya*) ...	76·50	3·54	3·52	1·00	4·40	1·04

Guano Phosphaté

Samples of phosphatic guano, actually used by small planters and collected by the Field Demonstrators of the Sugarcane Research Station from different parts of the island, have shown that their P_2O_5 content was on the whole extremely low.

These phosphatic fertilizers had obviously been adulterated, and legislative measures had to be drafted.

Three samples of rock were again collected at Serpent Island and analysed. The results have shown that the P_2O_5 contents were as low as 6·95 per cent, 5·08 per cent and 3·94 per cent respectively.

Meals

As in previous years, samples of meal bran from the Richelieu Maize Mill were analysed. The following figures were recorded.

	Moisture	*Ash*	*Fibre*	*Fat*	*Protein*	*Carbohydrate*
Meal A ...	9·58	3·30	4·25	7·29	16·87	58·71
Meal B ...	5·12	3·44	3·62	7·22	18·39	62·21

These meals are mixtures, with the following approximate composition:—

	%
Maize Bran	60
Poonac	20
Groundnut cake	10
Bean's flour	10

Alloy (White Metal)

At the request of the General Manager of Railways, samples of White Metal were analysed and gave the following composition:—

	Antimony	*Tin*	*Lead*	*Copper*
Crown Agent Metal ...	15·00	42·05	42·63	0·06
Lion Brand ,, ...	14·10	4·87	81·25	0·12
Babbit ... ,, ...	12·60	4·31	83·00	0·50

Milk

(a) At the request of the Animal Husbandry Officer, a series of individual tests was performed, in order to determine the variations in the butter fat of cows of Friesland ascendency.

These determinations have shown that on the average the figures were very satisfactory, in one case the figure of 8·3 per cent was reached.

(b) The quarterly analysis of milk samples from the Government Dairy was performed as usual. The average figures are satisfactory:—

	Total solids%	*Fat%*
Morning	12·47	3·7
Evening	13·57	4·65

Routine Analysis

754 samples were received involving 918 determinations.

The preparation and standardization of acid and alkali solutions for estates was carried as usual.

Miscellaneous

As usual, courses in Agricultural and Organic Chemistry were delivered during the year to the students of the College of Agriculture by the Acting Chemist and the Assistant Chemist, Central Board, seconded to deliver lectures.

Mr. E. Haddon was in charge of the work in connection with the aloe fibre investigation.

F. Berchon,
Acting Chemist.

Sugar Technology Division

Visits to Factories

The sugar factories and distilleries were all visited during the year and advice was given to millers and distillers on request. Routine analytical work was carried out for the factories and distilleries.

2. Milling

During the year under review, five milling tests were performed and recommendations issued after a thorough examination of all mechanical data. The results obtained are published in Table I.

Factory No. 5 shows the best mill extraction in spite of the obsolescence of the plant, probably on account of the low peripheral speed which ensures good juice drainage and relatively low grinding rate. In the case of Factory No. 1, it is interesting to note that the deeply intermeshing rollers of the first unit are of cast steel. It is the first time in Mauritius that cast steel rollers are fitted to a three-roller crusher. Cast steel rollers offer the great advantage that the teeth thereof are not broken by pieces of tramp iron or stones getting access to the plant, and the test figures show that when using such rollers, extraction is not impaired.

3. Phosphate content of juices

The mixed juice at four factories was tested for phosphates. The figures obtained are given in Table II. They show a low phosphate content compared with results published in other cane growing countries. Clarification tests showed that the phosphate content of the juices tested was insufficient for good clarification, and addition of phosphates was advised. In one case, Factory No. 1, addition of superphosphate at the rate of two hundred grams per ton of juice over a period of one month showed an increase in recovery of 1 per cent on cane ; also, a marked improvement in juice clarity was obvious.

4. Contrôle Mutuel

Factory data were compiled and circulated fortnightly among millers. The main figures referring to final results are given in Table III.

5. Control of Alcohol for Export

Routine control of all the alcohol exported from Mauritius was carried out and certificates issued in compliance with Government Notice No. 228 of 1948. The record export figure of 6,191,000 litres was reached for 1949. Towards the end of the year, however, export ceased due to the slump in the alcohol market. Complete analyses of the alcohol produced for export by the nine distilleries operating were performed and the results are published in Table IV. The composition of heads from stills Nos. 2, 7 and 9 are also to be found in the Table. The conclusions arrived at are as follows:—

(a) Esters can be reduced to an acceptable minimum only with a proper purifying column as in the case of stills Nos. 1, 2 and 4.

(b) Aldehydes are eliminated through pasteurisation. Chemical treatment does not eliminate aldehydes to the same extent. Still No. 1 where such a treatment is practised by means of Potassium permanganate produces an alcohol which is one of the highest in aldehydes.

(c) Velocity of vapours in the rectifying column shows a close relationship to higher alcohols content. In consequence, production for a given diameter should be kept within reasonable limits.

(d) When using molasses from raw sugar manufacture, a neutral alcohol is obtainable without chemical treatment in the still, provided the fermentation has been well conducted. No neutralising agent is used in still No. 2 which produces an alcohol having one of the lowest acidities.

(e) Only stills Nos. 1, 2 and 4 are capable of producing a high grade of rectified alcohol. The other stills would require the addition of a purifying column and in many cases reduction of output would be necessary in order to reach the grade, specially as regards higher alcohol content.

Still No. 2 has been modified locally according to plans supplied by this Division.

6. Calcium Aconitate

The production of calcium aconitate from molasses is under study. This commodity, which is now produced in several Louisiana sugar factories, is used in the plastic industry.

As a first step, the aconitic acid content of molasses produced in Mauritius was determined. The results of those determinations are given in Table V.

7. Investigations and Reports

At the request of the Manager of a factory, an enquiry was made into the control figures of the factory and a report issued, pointing out the anomalies observed.

At another factory, after having followed the work in all departments during two successive crops, recommendations were made so as to increase efficiency and cut down cost of production. Power consumption of mills were determined at two factories and recommendations made accordingly.

Modification of valve settings of a high speed engine has enabled one factory to work with one injection water pumping unit instead of two with a much called for improvement in the steam balance of the factory.

A complete boiler feed water analysis has been performed for a factory in collaboration with the Chemical Division, and recommendations made concerning adequate treatment of make up water.

For the first time in Mauritius, sea water has been used during the whole crop in a central barometric condensing plant. The installation was advocated and planned by this Division, as the factory under reference suffered from water shortage during the drier periods of the crop, and the fresh water available could be used for irrigation purposes and allow planting operations to be carried out during the crop period. The economic advantages derived therefrom are considerable.

8. Mission of the Sugar Technologist to France, England and the U.S.A.

The writer has visited France, England and the U.S.A. with a view to obtaining information on the sugar and alcohol industries of these countries. That mission is the subject of a separate report published by the Mauritius Chamber of Agriculture who financed the mission.

9. Educational

Lectures in Sugar Technology, Agricultural Engineering and Surveying were delivered at the Agricultural College by the Sugar Technologist and his Assistant during the year under review.

10. Miscellaneous

An aloe fibre decorticator has been erected for research purposes at the Department, under the supervision of the Sugar Technologist and will be operating soon.

Production of distillers yeast for human consumption, and of yeast bran mixture for stock and poultry feeding were continued at the Yeast Factory under the control of the Sugar Technologist.

S. STAUB,
Sugar Technologist.

TABLE I.

Results of Milling Tests

Factory No.	Date of Test	Milling Plant and Capacity	Sucrose % cane	Fibre % cane	Dilution % absolute juice extracted	Unit	juice extracted by front pressure % of Juice extracted by unit	Sucrose extracted by unit: % sucrose entering unit	Sucrose extracted by unit: % sucrose in cane	% total sucrose extracted	by unit and preceding units % sucrose in cane
1	21st September	K+4M I II, III, IV 32″×66″ 53 TCH	15·71	12·4	12·2	I	54·1	73·1	73·1	77·4	73·1
						II	—	37·5	10·1	10·2	83·2
						III	—	28·6	4·8	5·1	88·0
						IV	81·9	51·3	6·4	6·8	94·4
2	2nd August	K+4M I+IV 30″×66″ II 29″×63″ III 29″×66″ 43 TCH	12·88	11·3	19·7	I	—	72·5	72·5	75·7	72·5
						II	—	48·2	13·3	13·9	85 8
						III	—	24·7	3·5	3·7	89·3
						IV	—	60·7	6·5	6·8	95·8
3	4th October	K+Cr+3M Cr 29″×66″ I 32″×66″ II & III 30″×66″ 47 TCH	14·44	11.0	23·2	Crusher I	—	79·0	79·0	83·4	79·0
						II	85·1	50·7	10·6	11·2	89·6
						III	80·2	49·2	5·1	5·4	94·7
4	18th October	—	14·22	13·3	19·2	Crusher I	—	81·5	81·5	86·4	81·5
						II	—	20·3	3·8	4·0	85·3
						III	58·1	40·7	6·0	6·4	81·3
						IV	84·7	34·4	3·0	3·2	94·3
5	8th November	K+Cr+4M Cr 25″×″60″ I & II 30″×60″ III 30″×63″ IV 30″×66″	15·78	12·9	25·5	Crusher I	64.5	77·8	77·8	81·3	77·8
						II	—	47·9	10·6	11·1	88·4
						III	—	33·3	4·1	4·3	92·5
						IV	—	43·2	3·2	3·3	95·7

TABLE II

Factory No.	*District*	P_2O_5 *mgrs/litre Mixed juice*	*Date*	*Remarks*
1	Plaine Wilhems	112	30th November	—
2	Plaine Wilhems	125	30th November	—
3	Savanne	132	2nd December	—
4	Moka	88	5th December	—
5	Savanne	236	6th December	Petites Saisons

TABLE III

Average Crop Results 1946–1949

Year	*Sucrose % Cane*	*Fibre % Cane*	*Mill Extraction*	*Sucrose in Sugar % Cane*	*Reduced Boiling House recovery*	*Boiling House efficiency*	*No. of crushing hours per day*
1946	13·56	12·6	94·9	11·35	88·0	98·7	15·0
1947	14·37	12·5	94·9	12·26	87·8	98·7	18·2
1948	14·31	12·1	94·8	12·22	88·1	98·8	19·4
1949	14·33	12·0	94·7	12·19	87·7	98·5	19·8

TABLE IV

Distillery No.	°G.L 15°C	*Acidity g/Hl*	*Esters g/Hl.*	*Aldehydes (Jaulless and Esperel Method) g/Hl.*	*Higher Alcohols Komarowsky and von Fallenberg Method g/Hl.*	*Total Secondary constituents g/Hl.*	*Type of Still*
1	95·7	0·15	6·5	2·1	6·0	14·75	Lepage—Urbain U 2
2	95·4	0·09	9·5	1·5	8·0	19·09	Barbet B
4	95·5	0·15	13·9	1·6	9·0	24·46	Savalle T 3
4	95·5	0·06	8·6	1·8	18·0	28·46	Barbet B
5	95·5	0·12	13·8	1·2	18·0	33·12	Savalle T 3
6	95·4	0·11	12·9	2·3	33·0	48·31	Savalle T 3
7	94·8	0·16	13·0	1·5	39·0	53·66	Savalle T 3
8	94·9	0·06	14·7	1·6	74·0	90·36	Savalle T 3
9	95·2	0·15	13·8	2·7	78·0	94·85	Savalle T 3

TABLE V

Aconitic Acid Content of Mauritius Molasses

	Mon Désert	*Britannia*	*Réunion*
Aconitic acid % Final Molasses ...	2·60%	1·76%	2·77%

Legislation

The following Ordinance and Proclamations were issued during the year:—

Ordinance No. 51 of 1949—To provide for the control of the production and sale of Tea in the Colony.

Proclamation No. 1 of 1949—To control the importation of sugarcane, grape-vine plants, etc.

Proclamation No. 3 of 1949—To proclaim areas planted with Tobacco in the Island to be places infected, or suspected of being infected, with leaf curl disease of tobacco.

Proclamation No. 4 of 1949—To proclaim the rate of export duty leviable on the sugars of the 1948–49 crop.

Proclamation No. 12 of 1949—To prescribe the conditions under which the importation of mushroom spawn shall be permitted into Mauritius.

4014/7/51—1,005